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Contractors and Engineers Monthly

Vol. 49, No. 1 JANUARY, 1952 $4 a Year, 50 Cents a Copy

Covering the Field

- **Concrete Cutoff Constructed**
  The limited-access-highway job reported on page 5 is the first phase in a by-pass plan for a congested city.

- **Canal Dug, Lined**
  Excavation was the make-or-break item on a canal and wasteway contract, part of the Columbia Basin Project. Page 11.

- **Chesapeake Bay Bridged**
  The two-part story on pages 18-19 covers steel erection and deck paving of the 4-mile structure. Pix catch an assembled truss span being floated into place.

- **Roadsides Sodded, Seeded**
  Page 27 tells how roadsides got a complete cover of green: seeding and sodding [illegible]edian and shoulders; seeding and [illegible]ng on slopes; plain seeding else-

- **[illegible]nt and Apartments Built**
  [illegible]ld work paced design in the construction of a sponge-iron plant under a cost-plus contract. See page 32.
  Protection of adjacent property was the worst problem during construction of a concrete apartment building to relieve Denver's housing shortage. On page 97.

- **Hot-Mix Salvages Road**
  A 3-inch upper-decking gives nine miles of worn-out concrete a life expectancy of 5 to 15 more years. Page 37 deals with the restoration.

- **Piles Driven for Dock**
  Star of the job pictured on this page and described on page 40 was a special rig which drove timber anchorage piles for a steel-pile bulkhead.

- **Canyon Road Graded**
  Alignment, drainage, and subbase were improved in the biggest road job New Mexico ever let—see page 47.

- **Air Base Improved**
  The runway now extended and widened is one of the longest in the country—10,500 feet. A new taxiway and apron were in the contract too. Turn to page 54.

- **Snow Rigs Readied**
  For a look at one state's shop work on trucks and plow blades, see page 62. Radios are installed too.

- **Citizens and Highways**
  Page 74 suggests action which individuals can take to promote sound road programs in their states and nation.

- **County Roads Sealed**
  A county commissioner tells, on page 79, why he uses plant-mix carpet-coat seal instead of binder to improve oil roads.

- **Dealer Stresses Service**
  Others may be bigger, but they don't give better service—a motto that Mountain Tractor Co. lives up to. Page 82.

- **Dam Cableways Erected**
  The dam is Warragamba in Australia; a fixed head tower and two traveling tail towers support a dual cableway. Page 89.

(You will find "In This Issue" on page 4)

C. & E. M. Photo

The new dock at Morehead City, N. C. (see page 40) consists of a steel-sheet-pile bulkhead tied down to a line of timber anchorage piles. Here workmen cut off the batter anchorage piles to grade. In the background is the special pile driver T. A. Loving & Co. built for the $1,898,539 project.

NEWS AND VIEWS

of the construction industry—two headline jobs of last year

Two jobs very much in the headlines last year were the Kentucky Uranium 235 plant and the New Jersey Turnpike. The photo above scans the intake structure of a steam plant which will furnish half the power needed for the AEC's atomic production at Paducah. It's the Shawnee Steam Plant, which the TVA is building, and the first of its ten 150,000-kw generators will be installed by this time next year. The photo below catches the linkup of the last major N. J. Turnpike structure—the 6-lane Hackensack River Bridge—as American Bridge Co. crews swing a 927-foot girder, one of the world's longest, into place.

EMC Will Combat Engineer Shortage

The Engineering Manpower Commission of Engineering Joint Council is doing its utmost to fight the current shortage of engineers by a campaign calling for the fullest technical use of engineers, wherever they may be employed in the armed services or industry, and for increased enrollment of students in engineering colleges with corresponding draft-board consideration. In order to disseminate its views, the Commission has designated over 400 local representatives in all 48 states as well as Canada and the District of Columbia.

A manpower rally at a national engineering convocation in Pittsburgh last September was the occasion for the designation of these representatives, many of whom have already established state-wide engineering manpower drives. Top educators, executive industrialists, engineering consultants, and privately employed engineers form these local groups. They will campaign in their own areas and it will be their job to impress upon their fellow citizens the seriousness of the manpower shortage. Their committees will work under the joint guidance of the EMC and the Engineering Council for Professional Development, and will call upon all local opinion-forming groups such as youth organizations, businessmen's clubs, and teacher associations, to join the "grass roots" campaign, together with engineering constituent societies operated locally for the national societies.

T. A. Marshall, Jr., Executive Secretary of the EMC, explained that the campaign must concentrate on urging fullest possible utilization of engineers everywhere. An increase of 10 per cent in the usefulness of existing engineers is equivalent to adding 40,000 more qualified men to the working force, he said. Such long-range solutions as the encouragement of new enrollments in the engineering colleges cannot bear fruit for some years to come.

Mr. Marshall is confident that once the American public is made aware of the importance to the national security and daily life of the people of an adequate supply of engineers, everyone will play his part in putting an end to the critical manpower shortage.

Where That Road Dollar Goes

There must be quite a few anxious taxpayers who wonder exactly what happens to the dollars extracted from their wallets by road-user taxes. The Oklahoma State Highway Department believes they have a right to know, and it has inaugurated a series of education days designed to show its own citizens, at least, how the money is spent.

Director C. A. Stoldt is organizing "conducted tours" to the sites of major highway improvements nearing completion. Mike Donnelly, Administrative Assistant, directs the programs, and local civic organizations get the crowds together and take them to the scene of the construction and mixing plants. Once there, the contractor on the project takes over, explains all details of the mix, and accompanies the people to the spot where the paving is being laid.

This highway public-relations program got off to a good start when the first of the series of visits took place at Yukon. Dahlgren & Brooks, Oklahoma City contractor, was finishing a $1,107,000 job on U. S. 66. It was a 6-mile stretch of 4-lane asphaltic concrete, and the project, covering roadbed, bridges, and surfacing, drew a crowd which included many high-school students as well as adults. A powerful attraction as far as the schoolchildren were concerned was the offer of $100 to the student who named 20 of the most important essentials involved in road building. Teachers followed up the visit with classroom work on the information gained.

Mr. Stoldt is optimistic that his new venture will do a lot to correct some of the misconceptions about road construction which give rise to so much adverse criticism.

Scenery Versus Billboards

Relocation of the narrow, winding, steep road over Sideling Hill in Washington County, Md., has resulted in a 7-mile stretch of entirely new highway, built with wide-sweeping curves on an easier gradient of the mountain. For the whole distance the road cuts through an undeveloped area of wooded hills and valleys, and it is the aim of the Maryland State Roads Commission to preserve the natural beauty of the roadside by protecting it from commercialization. To this end, the Commission has reached an agreement with local outdoor-advertising concerns, by which the slopes of Sideling Hill will be kept clear of signs. The sign-free limits leave half a mile at the foot of the western slope and 1½ miles at the eastern end, as it is considered inevitable that there will be some commercial development near the junction of the old road.

But for five whole miles nature wins.

U. S. Defense Bonds are security bonds. Their purchase provides for your personal security as well as for the security of the country.

Contractors and Engineers Monthly

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A Plan the Public Will Buy

Our highway problems—both immediate and long-range—have become so acute that all groups and agencies concerned with highway transportation must sit down to some constructive contemplation, set aside differences and selfish interests, and come up with *real* solutions. The appalling inadequacies of our highways have been pointed out again and again. Certainly motorists and haulers are aware of them. What neither they nor, apparently, anyone else knows is what to do about them.

Right now there are two major problems—materials shortages and money. With all the money in the world, we couldn't embark on the gigantic road-building program necessary, because the steel isn't available. Some 576 projects under way last year were held up for steel, and the highway allotment for 1952 is even less. Since there apparently just isn't enough steel, the solution to *that* problem rests on a re-evaluation of the entire defense program.

What is it we are defending? From whom and with what? Will prodigious amounts of military supplies help us in a "war" which we are steadily losing because we're fighting with the wrong weapons? What we need is the kind of leadership which knows what we are defending, and how to do it without losing the things we most wish to keep. Our best defense against the "isms" we fear is the preservation of our productive capacities and standards of living—both are impaired by inadequate and unsafe highways.

In the other big and long-range problem—highway financing—we have still another staggering challenge. We hear speeches, read articles, listen to claims and counterclaims. Of late, several large manufacturing firms have devoted advertising space, pamphlets, and films to informing the public about the highway situation. This is all highly commendable. The public must have the facts. But the one way to get the highways we need is to pay for them. And that unpleasant fact manufacturers and public officials alike hesitate to stress, lest the poor harassed tax-ridden public rise up in open rebellion. Nevertheless there is reason to believe that the taxpayers, once thoroughly informed of the cost to them of inadequate highways, will not only support but *demand* a program for adequate ones.

Now is the time to get down to brass tacks; take a broad view of *highway transportation* costs, rather than just highway costs; bring together all groups and agencies concerned with highway transportation on a meeting ground of common interest and national welfare; recognize that we must pay for what we want; and give the public the facts—*all* the facts—about the situation and its remedy, including the news that good highways have to be paid for.

An enlightened public is a powerful force. One can't blame it for its present bewilderment—just look at the confusion and conflict among the "authorities". Let's evolve a sound sensible plan for financing needed highways and providing the essential materials for them; then let's take that plan to the people frankly and honestly; tell them what the program will cost, how the money must be raised, and how they will share in its financing.

We believe the public will buy it!

Read Those Contracts

A recent decision of the U. S. Supreme Court, sustaining a Federal agency in a suit brought by a contractor, again emphasizes the warning that contractors must read and understand their contracts thoroughly in order to avoid financial loss. In a 6 to 3 decision, the highest court of the land ruled that the dispute concerned a question of fact, and in such cases the decision of the department head is final, unless fraud on the part of the Government can be proved. Since the question of fraud had never arisen, the contractor, according to the majority interpretation, can have no recourse to the courts in such a case. Obviously, the decision has serious implications with reference to most Government contracts.

The dispute arose over the amount of adjustments under a change order in the construction of Vallecito Dam, Colo., in 1939 and 1940, which the Wunderlich Contracting Co. of Omaha, Nebr., was building for the U. S. Bureau of Reclamation. While the contractor and the Bureau agreed substantially on the amount of work, labor, and equipment time involved, they differed on the rental rates, and the rates for maintenance and repair of equipment used for the extra work. According to Article 15 of the contract, all disputes concerning questions of fact were to be decided by the contracting officer, with the right of appeal to the head of the department "whose decision shall be final and conclusive upon the parties thereto. In the meantime the contractor shall diligently proceed with the work as directed."

Wunderlich felt that the $44,208 offered by the Bureau of Reclamation, the contracting officer, was insufficient to cover the extra work involved, and appealed to the Secretary of the Interior, the department head. When the Secretary upheld the Bureau, the contractor brought suit in the U. S. Court of Claims and was awarded $155,748, with the Court finding the Federal Department's action "arbitrary", "capricious", and "grossly erroneous". The Supreme Court, in the final say-so, reversed the Court of Claims.

The majority opinion abided strictly by the wording in Article 15 of the contract, upholding the finality of the department head's decision "unless it was founded on fraud, alleged and proved . . . By fraud we mean conscious wrongdoing, an intention to cheat or be dishonest."

In a dissenting opinion, Justice Douglas stated that while the parties need not have made the contract, it gives the power of a tyrant to the contracting officer who may be stubborn, perverse, captious, incompetent, or negligent.

Justice Jackson in a separate dissent said in part: "Granted these contracts are legal, it should not follow that one who takes a public contract puts himself wholly in the power of contracting officers and department heads." Mentioning such factors as overzeal for the department, negligence of the deciding official, misrepresentations by subordinates, prejudice against the contractor, or other causes that fall short of actual corruption, the Justice stated that in his belief "one should be allowed to have a judicial hearing before his business can be destroyed by administrative action."

The Associated General Contractors of America, with 6,000 members throughout the country, is concerned over the potential effects of the decision. The association may take a cue from Justice Minton's majority report in which he said: "If the standard of fraud that we adhere to is too limited, that is a matter for Congress." Until, when, and if, such legislative remedy from the Court's decision does come about, it behooves contractors to study all the fine print in a Government contract, and to know just what they may be letting themselves in for at the hands of a Federal bureau or department head.

Constructors' Safety Awards

The National Constructors Association, New York, announces a safety-promotion program by which it hopes to cut the accident rate of member companies by 20 per cent between October, 1951, and October, 1952. The Association will award certificates of achievement at the January, 1953, meeting.

In order to further its safety goals, the Association plans to publish a monthly Safety News Letter, which will include safety news of general interest as well as that with particular application to chemical-plant, steel-mill, and oil-refinery construction, in which the members specialize.

Companies may compete for the award from October 31, 1951, to October 31, 1952.

In This Issue

Forty-Eight States United By Uniform Traffic Laws?

Everyone who takes his car abroad is necessarily on the lookout for unfamiliar traffic signs and different rules of the road. But it is disconcerting for a citizen motoring through his own country to find he is breaking the law through ignorance.

The National Highway Users Conference believes that uniformity of motor-vehicle and traffic laws throughout the 48 states is the only way to guard against confusion among drivers, with its resulting accidents and congestion on the nation's highways. In a booklet entitled "48 States . . . United!", the NHUC sets forth the case for uniformity in motor-vehicle laws. The Uniform Vehicle Code referred to in the booklet contains five Acts, as follows: uniform motor-vehicle (1) administration, registration, certificate of title, and anti-theft Act; (2) operators' and chauffeurs' license Act; (3) civil liability Act; (4) safety responsibility Act; and (5) uniform Act regulating traffic on highways. What to do about getting this code adopted is the emphasis of the booklet. Also included is a "parade of progress" showing how more and more states are responding to the NHUC campaign for uniformity.

"48 States . . . United!" may be obtained from the National Highway Users Conference, National Press Bldg., Washington 4, D. C.

More scrap metal is needed again to maintain and increase high steel output. So put your scrap to work.

What's cooking? "Quality concrete", says the Constructors Association of Western Pennsylvania, which sponsored a series of lectures on this subject at the Sheraton Hotel, Pittsburgh. J. W. McKnight (second from left), Portland Cement Association, directs the mixing by volunteers Domenico J. Bonomo and Alfred A. Valerio, of O. H. Martin Co., and A. F. Peternel, Ben Construction Co.

Cutoff Is Under Way At Bottleneck City

Dual Concrete Highway in Pennsylvania Will Ease Traffic Congestion; 3 Overpasses Provide Limited-Access Features

C. & E. M. Photo

A Gradall on an International K8F truck excavates for a concrete base course on Lititz Pike, which the new cutoff crosses on a grade-elimination structure. The Gradall loads to a bottom-dump Euclid.

•ON a map, busy Lancaster, Pa., appears as the hub of a wheel whose spokes are highways radiating in more than a dozen directions. The resultant traffic converging on the hub from these roads makes downtown Lancaster a highly congested area, and a difficult city for vehicles to get through. The Pennsylvania Department of Highways is relieving this condition by constructing a cutoff north of the city, which eventually will permit through east-west traffic to by-pass the troublesome bottleneck in Lancaster.

This cutoff is an extension of dual highway U. S. 230, which runs northwest from Lancaster toward Harrisburg. Entirely on new location, the by-pass begins at Manheim Pike, State Route 72, and continues easterly to dead-end just east of Oregon Pike, U. S. 222. A future extension will pick up at that point and continue the by-pass about 5 miles farther east to meet the Lincoln Highway, U. S. 30. While the full traffic benefits will not be felt until the entire cutoff is in operation, considerable relief from congestion will be realized in the current improvement.

Located entirely in Lancaster County, the project has a total length of 4.37 miles, a 2.28-mile section of which is on the main line of the new route. The remaining distance, a little over 2 miles, consists of road work on the highways that are crossed by the by-pass. For this is a limited-access highway with grade-elimination structures that carry the new route over the existing roads. The three bridge overpasses included in the project are at Manheim Pike, State Route 72; Lititz Pike, State Route 501; and Oregon Pike, U. S. 222. Lesser traveled routes such as Roseville Road and Fruitville Pike are crossed at grade.

A Borrow Job

Construction on the divided dual highway began on August 14, 1950, after the Pennsylvania Department of Highways awarded a general contract for the work to H. J. Williams Co., Inc., of York, Pa., on its low bid of $1,857,-671.82. By the end of the year the grading was completed, and the job was shut down for the winter. Work was resumed in March, 1951, on the foundation underdrain and the special subgrade or base, and by June paving on the concrete roadways got started. Structural steel for the bridges was a problem throughout the project, but despite the serious shortage, completion of the contract was expected by early autumn.

Besides the three principal bridges, the job included a concrete-arch structure and a box culvert for stream crossings. The structures were subbed to John H. Wickersham Engineering & Construction, Inc., of Lancaster, while the prime contractor pushed ahead on the grading. Excavation came to 155,-367 cubic yards in the estimate, but as the roadway is an embankment fill for most of its length, the borrow item was comparatively high, totaling nearly 500,000 yards.

To supply this very essential dirt, H. J. Williams Co. bought a 69-acre farm near the western end of the new highway, and dug up an area about 40 acres in size. A layer of topsoil, one foot in depth and about 70,000 cubic yards in volume, was stripped off the site and stockpiled. Later, when the pit had yielded all the material necessary, the topsoil was spread back over, thus removing the scars of construction. Beneath the topsoil was a layer of clay, averaging 8 feet in depth, overlying a stratum of limestone. Excavation went down to rock in obtaining sufficient dirt for the embankment fills.

Long Haul

Most of the borrow material was excavated with a Euclid loader, pulled by a pair of Caterpillar D8 tractors, loading into a fleet of 24 Euclids—12 bottom-dumps at 15 yards and 12 end-dumps at 13 yards. For the length of the job, the average haul was rather long—8,027 feet one way or slightly over 1½ miles. A careful check was

(Continued on next page)

Cutoff Is Under Way At Bottleneck City

(*Continued from preceding page*)

kept on production, and for the 56 days that the loader worked it turned out 20,842 loads in 7,833 unit-hours. In cubic yards per hour the range ran from 390 to 1,027, with the average hourly output 546 yards. Excavating conditions were far from ideal since the underlying stratum of rock was uneven. Thus, as the pit deepened, there were few long stretches of uniform depth available to the loader.

Dirt was also moved with 5 Terra Cobras, self-propelled units, averaging 12 yards of pay dirt on ½-mile hauls. For shorter hauls, averaging 800 feet, the contractor used 4 Caterpillar 15-yard scrapers pulled by D8 tractors. Two D8 push tractors were available for loading these units. General dozing and leveling off the fills in 4-inch compacted lifts was handled by 4 Caterpillar tractors—2 D8's and 2 D7's. Compaction was done with six 10-ton 3-wheel rollers—5 Buffalo-Springfields and a Galion.

In removing approximately 60,000 cubic yards of rock, blast holes were opened up with wagon drills and charged with National 40 per cent dynamite. The broken-up rock was loaded out by a Lima 802 2-yard shovel into the end-dump Euclids.

Considerable grading was also necessary in improving and widening the roads crossed by the new highway, in connection with the accesses or approaches to the cutoff. A Gradall machine, mounted on an International K8F truck and equipped with a 12 to 24-foot telescopic boom and a ½-yard bucket, excavated in these areas. The 24,000 linear feet of 6-inch foundation vitrified-clay underdrain, supplied by Central Clay Products Co. of Wilkes-Barre, Pa., was laid in trenches dug along the side of the road by a Cleveland Model 95 trencher. The larger concrete drainage pipe, 12 to 36-inch diameter, was furnished by New Holland Concrete Products, Inc., of New Holland, Pa. Trenchwork for this pipe was generally handled by a Koehring ¾-cubic-yard shovel with a backhoe attachment.

Pavement on 6-Inch Subgrade

As a foundation course for the reinforced-concrete pavement, a 6-inch layer of special subgrade was placed for the full width of the roadway out through the shoulders. The material was crushed limestone, graded from 2 inches down to fines, obtained from a quarry at Talmage, Pa., 15 miles from the job. Trucks delivered and end-dumped the special subgrade, which was then spread by a Caterpillar motor grader, and rolled by the 10-ton 3-wheel rollers.

C. & E. M. Photo

A Cleveland Model 95 trencher digs a bed for vitrified-clay pipe along Lititz Pike, Pennsylvania Route 501.

On the cutoff there are two reinforced-concrete pavements, of 9-inch uniform depth, 22 feet in width, and separated by a 4-foot-wide raised divisor strip. On the outside are 10-foot shoulders making the roadway 68 feet in width. The shoulders are surfaced with a 3-inch course of selected stone. Each 22-foot pavement is laid in two 11-foot lanes, the inner lane being pitched 1½ inches and the outer lane 2 inches, with drainage out to the shoulders. The shoulders slope at the rate of ¾ inch to the foot.

The 4-foot divisor is a strip of plain concrete, 6 inches thick, with a white concrete reflecting curb along each side. Between the pavement slab and the curb there is a ¼-inch expansion joint. The curb construction was subbed to Polselli & Angelucci of Philadelphia, Pa., which used Atlas Duraplastic white cement to obtain the white mortar reflecting surface. Curing was

(*Continued on next page*)

effected with Wall Products membrane compound.

Concrete Batch Plant

A concrete-batch plant was set up in a large tract of land adjoining a siding of the Pennsylvania Railroad and just off Fruitville Pike. Dead haul with the batch trucks was only ½ mile to the center of the project. Bulk cement, air-entrained at the mill, was shipped to the plant by rail from three different sources in Pennsylvania—Lone Star at Nazareth; Keystone at Bethlehem; and Alpha at Martins Creek. It was unloaded by worm-gear conveyor under the tracks and enclosed elevator into two Butler cement bins holding 300 barrels each.

For the coarse aggregate, two sizes of limestone—3A and 2B—were obtained from the quarry of D. M. Stoltzfus & Son at Talmage, Pa. Sand for the fine aggregate came from the Milton Grove Sand Co. at Mount Joy, Pa. Both suppliers delivered the material by truck to a Blaw-Knox 75-ton 3-compartment aggregate bin. Because of the specifications requirement that aggregate be stockpiled at least 18 hours before use, two sets of piles for each material were built up on opposite sides of the bin. The aggregate was handled between stockpiles, and the bin charged, by a Lima crane with a 50-foot boom and a Hayward 2-yard clamshell bucket.

Water for the concrete came from the Lancaster city supply. From a main on Fruitville Pike, a short section of pipeline was laid to the batch plant. This tap filled the two 1,000-gallon tank trucks supplying the paver with water. By means of a long tongue, the paver towed the tank truck along by the rear end, as a pump on the paver drew out the water through a 2-inch hose. While one tank truck was at the paver, the other was being refilled with water.

The Mix

The dry weights of a typical 8.74-bag batch of concrete were as follows:

Cement	831.6 lbs.
Sand	1,488.0 lbs.
2B stone	1,409.0 lbs.
3A stone	1,396.0 lbs.
Water (48.07 gals.)	400.4 lbs.
Total	5,524.0 lbs.

Water per bag of cement was 5.5 gallons, and the mix had an average slump of 1½ inches; air content was around 3 per cent. Each batch yielded 1.36 cubic yards of concrete weighing 146.9 pounds to the cubic foot.

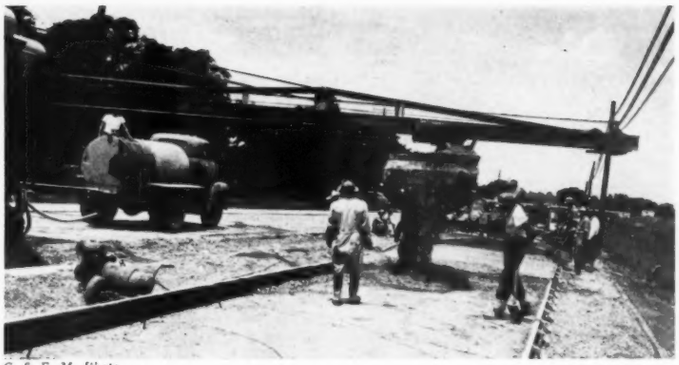
Gradation of the type A sand and the two sizes of coarse aggregate were as follows:

Sieve Size	Per Cent Passing		
	3A Stone	2B Stone	Sand
2½-inch	100	....	....
2-inch	90–100	....	....
1½-inch	35–70	....	....
1¼-inch	....	100	....
1-inch	0–15	90–100	....
½-inch	....	20–50	....
⅜-inch	....	....	100
No. 4	....	0–10	90–100
No. 20	....	....	40–75
No. 50	....	....	10–30
No. 100	....	....	1–8

Dry batches were hauled to the paver in eight trucks holding two batches each, with separate metal containers for the cement. They first drove under the aggregate bin to be loaded with sand and stone, then continued under one of the cement bins which were in line 100 feet apart and parallel to the railroad siding.

Paving Procedures

Into the special subgrade, trenches for the forms were cut by a Cleveland Formgrader. Some 10,000 linear feet of Heltzel 9-inch forms were on the job. On the side adjoining another lane, a steel keyway was wired to the forms through holes drilled in the steel, thus providing a good bond, together with hook bolts placed on an average 5-foot spacing. These hook bolts are ⅝-inch diameter and extend 8 inches into each adjoining slab.



C. & E. M. Photo

A Rex 34-E dual-drum paver drops a batch of concrete on the Lancaster cutoff. Note the Maginniss vibrator at the side of the forms.

Form pins were driven by an Ingersoll-Rand air hammer powered by a truck-mounted I-R 160-cfm compressor, and any excess material over the exact depth between the forms was thrown off to the side by a Blaw-Knox subgrader. The subgrade was given a final rolling by an Ingram 3 to 5-ton 3-wheel roller, which was followed by a planer and scratch board as a final check on the depth of slab.

Since the paver always worked outside the forms, the contraction and expansion joints were laid out well in advance of the paving operations. Bethlehem Steel Co. of Bethlehem, Pa., supplied all joint assemblies, dowels, and reinforcing steel. Contraction joints are on 61.5-foot centers, with a ¾-inch fiber expansion joint at every tenth contraction joint, or 615 feet apart. Dowels at the transverse joints are 18 x 1-inch on 12-inch centers.

Finishing Operations

Batches were mixed for 1¼ minutes in a Rex 34-E dual-drum paver equipped with a 35-foot boom, then deposited between the forms in front of a Jaeger concrete spreader that leveled off the material 2 inches below the top of the form to receive the wire-mesh reinforcing steel. The spreader carried a Maginniss vibrator for vibrating the

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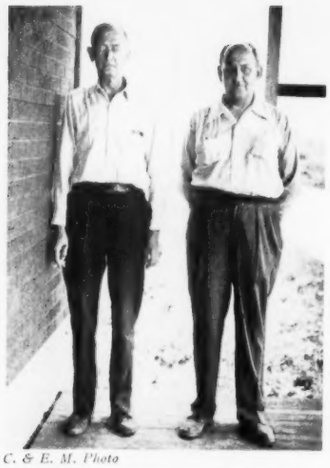

C. & E. M. Photo

Paul deHaven (left) was Resident Engineer on the cutoff project, and Dale E. Dietz was Superintendent for H. J. Williams Co.

Cutoff Is Under Way At Bottleneck City

(Continued from preceding page)

bottom course of concrete at the sides and across the joints. After the steel and more concrete were placed, the surface was mechanically finished by a Jaeger-Lakewood two-screed finisher and a Koehring Longitudinal Finisher.

Hand finishers checked the results with long-handled straightedges, gave the surface a burlap drag finish, and edged the joints with a ¼-inch-radius tool. Sisalkraft paper was rolled over the slabs and kept on for 72 hours until the concrete had cured. Longitudinal and transverse joints were later poured with asphalt.

On the main line the paving progressed in general from west to east. Three of the four 11-foot lanes were laid with the paver working along the subgrade of the next lane to be paved. For the final lane the paver got up on the concrete, two lanes over, which had been paved for at least 10 days.

Paving on the roads going under the cutoff at the interchanges followed the same pattern of four 11-foot lanes except on Lititz Pike, State Route 501. Here, to conform to the existing-type pavement, a 12-foot lane of 9-inch plain-concrete base was laid along the east side of the Pike and covered with 3 inches of bituminous-concrete surfacing. Part of the old pavement was removed and replaced with the concrete-blacktop construction to provide a 50-foot paved surface. Since the base was not reinforced, the spreader was dispensed with and the concrete was finished off by the two-screed finishing machine. The base course also has no transverse joints. In the hand finishing, the surface was scored with a wire rake, to roughen it for a better bond with the hot-mix.

The various access roads or approaches to the cutoff at the interchanges are also paved with concrete in lanes 14 feet wide. Because of the cut-up nature of the project, with the paving scattered over several locations, and bridges breaking up the straightaway, no records were set in laying concrete. Progress was steady, however, and the long string of paving and finishing equipment was moved about from one spot to another with a minimum of lost time and motion. When not on excavation, the Gradall was used in shifting forms.

Interchange structures are built with concrete-bent piers supporting steel stringers and concrete deck slabs. The steel superstructure was supplied by the Lehigh Structural Steel Co. of Allentown, Pa.

Quantities and Personnel

Major items in the paving and bridge contract included the following:

Excavation, class I	155,367 cu. yds.
Borrow	468,866 cu. yds.
Concrete pipe, 12 to 36-inch	5,874 lin. ft.
Tile underdrain, 6-inch	24,000 lin. ft.
Bridge concrete	2,955 cu. yds.
Reinforcing steel	483,657 lbs.
Structural steel	2,320,210 lbs.
Concrete piles, 14 to 38 feet	8,222 lin. ft.
Plain-concrete base, 9-inch	15,530 sq. yds.
Reinforced concrete pavement, 9-inch	98,369 sq. yds.
Special subgrade	165,640 sq. yds.
Shoulders	18,396 lin. ft.
Plain cement-concrete curb	7,085 lin. ft.
White concrete reflecting curb	33,017 lin. ft.
Bituminous surfacing	6,225 tons

H. J. Williams Co., Inc., with its subcontractors, employed at the peak of construction a force of over 200 men under the direction of Dale E. Dietz, Superintendent.

For the Pennsylvania Department of Highways, Paul "Slim" deHaven is Resident Engineer. The project is in District 8 of which A. J. Bedard is District Engineer with headquarters at Harrisburg. The Department is headed by Ray F. Smock, Secretary of Highways, with E. L. Schmidt, Chief Engineer. W. A. Warrick is Chief Construction Engineer.

Simplicity of construction marks Marlow's new self-priming centrifugal pumps. They are available in capacities up to 240,000 gph.

New Self-Priming Centrifugal Pumps

A complete new line of contractors' self-priming centrifugal pumps has been announced by Marlow Pumps, Ridgewood, N. J. Entirely redesigned, the pumps are said to feature simplicity of construction; fast, high, and dependable priming; and maximum trash-handling ability. They cover a pump range of 1½ to 10 inches, and are available with capacities up to 240,000 gallons per hour. This includes all AGC sizes plus several others. The company reports that full AGC ratings are met at moderate engine speeds. Special high-pressure models for water supply and jetting are also available. The pumps can be changed from base-mounted units to steel-wheel or pneumatic-tire-mounted units without changing the base. Models equipped for burning kerosene or diesel fuel are also available from stock.

Marlow points to the simplicity of construction: a check-valve assembly, a tank, a diffuser, an impeller, and a shaft seal. The check valve is conveniently mounted on the outside of the pump, forming an accessible porthole reaching directly to the pump impeller. The tank is cast in one piece and may be removed by loosening a single circle of bolts, exposing the working interior parts of the pump. The diffuser is held in place by the tank and can be lifted off the impeller when the tank is removed. Assembly and disassembly are simple.

One of the principal merits of the new unit, according to the company, is that only the impeller and diffuser can wear. Both may be easily replaced, restoring original factory efficiency, the company says. Suction and discharge connections are male-threaded and hose connections are made directly to the pump without extra fittings. Priming and repriming operations are entirely automatic. Passageways through the impeller and diffuser have been designed with larger clearances so that trash-handling ability is improved. The multipoint air-stripping action of the Marlow diffuser is said to provide fast priming. Suction lifts of 25 feet are guaranteed by the manufacturer.

Further information may be secured from the company. Or use the Request Card that is bound in at page 16. Circle No. 352.

Barber-Greene Personnel

There are three recent changes in the sales organization of Barber-Greene Co., Aurora, Ill., manufacturer of asphalt plants and finishers, belt conveyors, bucket loaders, snow loaders, etc. W. B. Holder, formerly General Sales Manager, will be head of a new division, the details of which will be announced later; E. H. Holt becomes General Sales Manager, with responsibility for Barber-Greene's over-all sales policy and direct supervision of the Aurora and domestic sales organization; and J. D. Turner is Director of Publicity and Promotion. Mr. Holt has been with Barber-Greene since 1939, and Mr. Turner since 1925.

Barber-Greene Co. celebrated its thirty-fifth anniversary last year. The company is now constructing a new office building.

Brake for Hoist Unit

A centrifugal governing friction brake has been designed for the power units of Waco portable elevators and material-hoisting towers, announces Wilson-Albrecht Co., Inc., 3565 Wooddale Ave., Minneapolis 16, Minn. The built-in brake is said to govern platform descending speed and automatically check the free-fall speed of a 1,500-pound load at 100 fpm. The tower and elevator for which this power unit is designed has a maximum capacity of 1,000 pounds. The brake has a surface of 33 square inches and is contained in an aluminum-magnesium housing with a high heat-dispersion factor.

The brake pictured here on a Model 806 gasoline power unit for Waco material-hoisting towers governs platform descending speed and checks the free-fall speed of loads.

Power units for the portable elevator and material-hoisting tower are interchangeable 6-hp gasoline or 3-hp electrical ones. The brake housing (with fins) lies between the gear box and the clutch on the power shaft.

Further information may be secured from the company by requesting Form PS-28C. Or use the Request Card at page 16. Circle No. 256.

Biggs for Franki Foundation

Richard A. Biggs, development and architectural engineer, has joined the Franki Foundation Co., Pittsburgh, Pa., specialist in foundations. He was Director of Architectural Development for the Crucible Steel Co. of America before his present appointment. His offices will be at 114 E. 40th St., New York City.

Independent power supply through a front-end power takeoff is a feature of the improved Overshot loaders.

Loader Is Improved

Two major improvements in the Overshot loader, Models 4C and 6C, are announced by John Austin, Inc., 2 Santa Fe Drive, Denver, Colo. Power to the bucket is now supplied independent of the main transmission system through a front-end power takeoff. This is said to allow the operator more flexibility for fast operation of the machine. One lever operates the entire bucket cycle.

A new laminated wrap-around chain has replaced the old wrap-around cable used to raise and lower the bucket. The bucket is actuated through two of these laminated wrap-chains—one on each side of the loader. In digging position, the laminated chain is all on a small-diameter hub for maximum power. As the bucket lifts, the chain rolls up on top of the hub giving uniformly accelerated speed to dumping position, Austin says. Several structural changes have also been made to lengthen the service life of the loader.

Austin manufactures loaders in four models, from 1 to 3½-cubic-yard bucket capacity. Special designs are made for underground work.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 334.

Hard-Surfacing Electrodes

Data on the use of Seaco ac-dc hard-surfacing welding electrodes for equipment and parts maintenance are outlined in the latest issue of the "Manganal Marketer", available from the Stulz-Sickles Co., 134 Lafayette St., Newark, N. J. Seaco rods are designed to prolong the life of manganese-steel parts and Manganal build-ups by forming a protective armor which takes the brunt of the initial impact and abrasion, allowing the rebuilt or repaired parts to work-harden before the wearing process starts. Carbon or other alloy steels can also be coated with Seaco hard-surfacing for longer life, the literature says.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 342.

Surveying Instruments

The 52nd edition of the "Manual of Surveying Instruments" has been issued by W. & L. E. Gurley, Station Plaza, Troy, N. Y. It combines details on how to adjust Gurley instruments with instructions on the care and handling of all transits, levels, alidades, compasses, and accessory equipment.

The 152-page manual includes a complete explanation of the theory and application of the Beaman stadia arc, types of reticles and reticle patterns for particular purposes, level-vial construction and use, as well as assorted tables of logarithmic and natural functions, distance and elevation stadia readings. It contains illustrations and a discussion of good surveying habits.

This manual is available to engineers and surveyors at a cost of $1.00.

Canal Contract Fits Irrigation Schedule

Main Canal and Wasteway on Columbia Basin's East Section Pushed Rapidly to Get Ready for Water

• WORKING against time, Western Contracting Corp. of Sioux City, Iowa, literally moved the earth near Moses Lake, Wash., to carve another big section of the Columbia Basin irrigation project. For slightly over $2,000,000 the firm built 13 miles of the main East Low Canal, and approximately 3 miles of the Weber Wasteway, a concrete-lined channel to carry excess irrigation water away during emergencies. The project is a part of the U. S. Bureau of Reclamation program in the rich agricultural basin.

Started March 20, the job was completed by September 1 to make way for the first irrigation water. The giant pumps at Grand Coulee Dam started turning in July, and water reached Long Lake, not far from Western Contracting Corp.'s canal, by September 1. Thus the target date was touch and go.

Canal Design

The main section of East Low Canal is unlined, with a bottom partly 68 and partly 64 feet. Sideslopes on both sections are 1½ to 1: there is a 22-foot berm; and the water depth is scheduled to be 16.5 feet.

The Weber Wasteway, which takes off from the canal near U. S. 10 about 11 miles east of Moses Lake, is a somewhat tricky structure from the standpoint of hydraulics. It pitches downward at several points on grades as sharp as 2 per cent. Velocities are expected to reach 25 mph when the wasteway is in use. A 6-inch concrete lining, reinforced with 1½-inch steel spaced on 12 x 8-inch centers, was therefore designed to carry the water.

Excavation

Excavation was definitely the "make-or-break" item in the contract. East Low Canal passes through gently rolling country at this point, and is flanked by good farmland on the downward side. But in many spots the soil is thin. When parts of the canal were opened up, crews found that a layer of hardpan lay over much of the area. Too, many spots consisted of thick chunks of basalt, caliche, and other volcanic formations difficult to drill and shoot. Approximately 1,000,000 cubic yards of the 5,000,000-yard total consisted of caliche and basalt. The balance of material was common excavation.

A fast, mobile, high-capacity drilling and powder outfit was developed to keep the rock formations broken up ahead of excavating machinery. Two of Ingersoll-Rand's newest compressors, the 600-cfm Gyro-Flos, were brought in. Other compressors included five 500-cfm Ingersolls and a 500-cfm Chicago Pneumatic.

A fast-moving drill team was built up around the two Gyro-Flo machines. The two compressors, which use a rotary device to deliver air, have no reciprocating parts. Moreover, they are so light that a pickup truck could pull them. They were hitched to each other and connected to a common air-receiver tank, with a delivery pipe and hose leading down to the five Ingersoll-Rand wagon drills which the two machines would pull.

When this outfit had to move, a tractor hooked on the compressors, receiver tank, and a small mobile shop and office. The foreman's pickup towed the five wagon drills, and the whole outfit could move several miles in a very short time.

A second drilling outfit, built around the other compressors, also was active most of the time. Seven Ingersoll-Rand wagon drills were used around this spread.

In both spreads, drilling procedure was much the same. Timken steel, often as long as 30 feet to get 5 feet below canal grade, was used. Bits consisted of Timken standard rock types, and Ingersoll-Rand Carsets. As a rule the Carset bits were used in hard basalt,

(Continued on next page)

C. & E. M. Photo.

It may look far away, but it was 100 yards too close for the cameraman, who got caught in a shower of rocks. Western Contracting Co. used 24 tons of Du Pont powder on this canal shot.

C. & E. M. Photo

Two Ingersoll-Rand 600-cfm Gyro-Flo compressors were the core of one drilling team.

Canal Contract Fits Irrigation Schedule

(Continued from preceding page)

while the other rock bits saw service in caliche and softer formations.

The holes went down in various patterns, but one of the most popular was a 6-foot square grid, with holes carried 5 feet below grade line. Columbia Basin rock is some of the worst to shoot that veteran drillers and powdermen have run up against, and it is especially tough whenever attempts are made to get stingy with powder. A rule of thumb which old-timers use in this Basin country is one pound of powder per cubic yard of rock. On Western's contract, excellent breakage was achieved, and all the shots were good ones. But it took one pound of powder and sometimes a little more where the formation was tough.

If the rock was fairly solid, straight-barrel loading was done. Where plenty of powder was indicated, powdermen used a method of water springing which worked very well. Three cartridges of DuPont 40 per cent stick powder were placed in the bottom of each hole, and a 5-gallon can of water was dumped in on top. The powder was then exploded by a hand-blasting machine. Often this first springing charge cleaned the hole so well that blowpipes did not have to be used. After the first springing, approximately 8 sticks were put down and another 5 gallons of water added. This springing charge then blew a pocket capable of holding a heavy charge of powder at the bottom.

On "slick-hole" shooting, stick powder was used. On springing shots, DuPont 40 per cent bag powder went in. Instantaneous blasting caps were used, with holes connected in parallel and fired by a 110-volt electric generator. Shots containing as much as 24 tons of powder were set off at once.

Ted McDaniel, under whose supervision the powder work and drilling was done, is known on many a job as one of the most careful and competent powdermen the Columbia Basin has seen. When he finishes with a shot, the rock is in shape so draglines can muck it out and fast. McDaniel is a lone wolf so far as his powder work is concerned. He personally does all the final checking on all his shots. He is one of the true old-timers of powder work and never mixes the responsibility for shooting. When the time comes to make a shot, it is McDaniel who personally makes the final wire connections, tests the circuit, and throws the switch. It is McDaniel who makes the final inspection to see that all men are in the clear.

Canal excavation was done by two Marion draglines, each with a 90-foot boom. There was a 151-M with an 8-yard bucket, and a 111-M with a 4-yard can. Both buckets were Hendrix, with Esco adapters.

A 3-yard Koehring 605 dragline also did some of the structure excavation, and then doubled over at the batch plant as a charging clam. As a general rule, the 111-M Marion handled lighter excavation around structures, working from the berm at one side of the canal. It also handled part of the canal prism. But the bigger 151-M was the workhorse of the outfit, and Excavation Superintendent D. M. Costner, who directed that operation, made sure the 151-M worked at capacity as much as possible.

The canal excavation was disposed of by casting along each side of the ditch. In general, the canal was dug at a single pass where the excavation was

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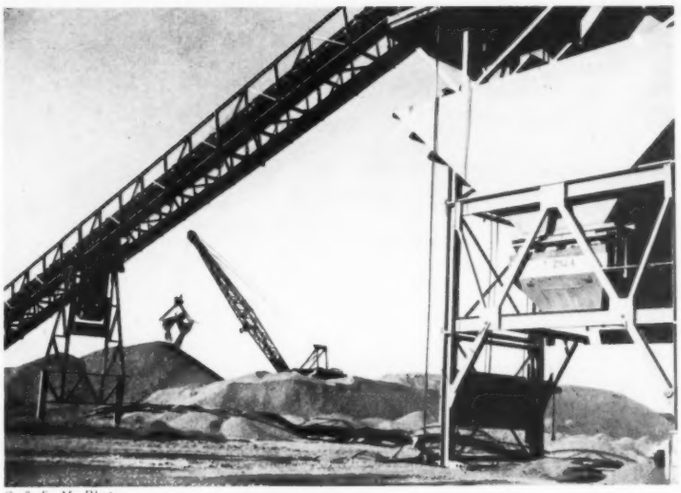
common. Where a shallow layer of dirt lay over rock, the 111-M dug the dirt to rock and then moved back in later after the drillers and powdermen had finished. All in all, it was a fast, well timed operation which produced good yardage every month.

New Type of Canal Trimmer

When the draglines had finished with the canal prism, it was within 6 inches of grade. A new-type canal trimmer, made to Western's specifications, was used to great advantage. Fortunately, the Weber Wasteway, with its 12-foot bottom, lies mostly in good agricultural soil, so the part of the job which called for concrete lining was easy to trim.

The trimmer was rail-mounted, and was winched forward by a 2-part cable laid ahead to the railroad track. The machine was powered by a Caterpillar D17000 diesel-electric generating set, which delivered electricity to the various motors. A 1,000-gallon water tank was carried on this rig to act as ballast, and also to furnish a sprinkling supply.



C. & E. M. Photo.

Framed by a Johnson semiautomatic batching plant, a 3-yard Koehring 605 dragline, doubling as a charging clam, stacks concrete aggregates.

Instead of the usual endless chain of trimming buckets, this machine utilized a combination of cutter-tamper feet and an endless bucket line on each side of drag blades, which carried the material down to the canal bottom. There were 15 of the combination cutting shoes and tamping feet on each slope. Driven by cams, they knifed ahead and compacted the canal banks at the same time. Excess dirt was scooped down behind these feet by the bucket line, and picked up by a 12-foot loader built into the machine. The loader buckets discharged to the stacker conveyor, leading off to the side of the machine.

The trimmer was conventional so far as line and grade equipment was concerned. A steel pointer, referred to a taut wire, kept the machine on line and grade. Hydraulic jacks at each corner of the rig were used for up-and-down adjustment.

One of the well known problems of canal lining has to do with trimmer delays. This machine presented none of these problems, and managed to keep out ahead of the lining crew at all times. The trimmer crew even took care of the excavation and placement of weep-hole gravel at frequent intervals. A gravel hopper and three feed pipes with manual slide gates were trained down to ground level behind the machine, so it was a simple matter for the labor crew to dig out the drains and fill them with granular material.

Machine Does Lining

A slip-form liner was used for placing the concrete lining. Because of the sharp hydraulic gradient and high water velocities, the lining is 6 inches thick. It has unfilled dummy contraction grooves on 12-foot centers both ways. A special combination cutoff key and expansion joint 2 feet wide and 30 inches deep, equipped with sliding dowel steel and a rubber water stop, was placed every 300 feet.

The slip form had a 3-foot vibrating apron and a 3-foot trail apron. It carried 11 Syntron vibrators and 2 Viber electric internal-type vibrators. All of these were mounted on the bottom part of the spreader diaphragm. The slip form used wide wheels to get around curves; in fact, the only flanged wheel on the machine was on the guide side. A Caterpillar D13000 diesel-electric set furnished power for the motors. A winch arrangement was used to move this machine forward. A 1,000-gallon water tank mounted on the machine furnished ballast to balance the rig, gave water for sprinkling ahead of the concrete lining, and provided a valuable standby supply for the paver in case water tanks broke down on the road.

The paver which supplied the slip form with concrete was a Koehring 34-E Twinbatch machine, equipped with a standard boom and dump bucket. Mixing water came to the paver in a Euclid-powered 6,000-gallon tank, and there were also two 2,500-gallon DW-10 tankers which hauled to the paver or sprinkled haul roads. Mixing water had to be hauled about 4 miles from a local agricultural well.

Concrete aggregates had been manufactured previously under another USBR contract with J. E. Shotwell. They were delivered to a Johnson semiautomatic batching plant near the job, and mixed out in 1½-yard dry batches. A Johnson cement silo was also used for weighing bulk cement for the mix. A fleet of 15 company-owned International batch trucks each hauled 2 batches at a load to the paver.

Concrete from the paver was dumped into the delivery car aboard the slip form, and distributed to all parts of the machine.

A crew of 9 cement finishers, working

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Canal Contract Fits Irrigation Schedule

(*Continued from preceding page*)

from platforms on the rear of the slip form and also from the curing bridge, placed the final finish. The dummy joints were cut by a large steel knife on the curing jumbo. Air pressure and a Syntron external-type vibrator forced this knife into the lining. It was an easy matter for cement finishers to edge these joints later on. The 2½-inch weep-hole pipes were also installed at this time.

The lining was cured by Hunt Process White membrane, applied by spray. Tracks were handled by a Caterpillar-mounted side boom, and hauled ahead on a flat-bed trailer. The track sections were about 35 feet long.

Reinforcing steel was handled efficiently, ahead of the slip form. Steel Construction Co. of Portland, Oreg., had a subcontract to furnish and install this material. The steel was prefabricated in mats in a central yard, hauled to the site, and placed by a Link-Belt Speeder truck crane. Afterward, steel men positioned the mats and placed concrete spreader blocks beneath them.

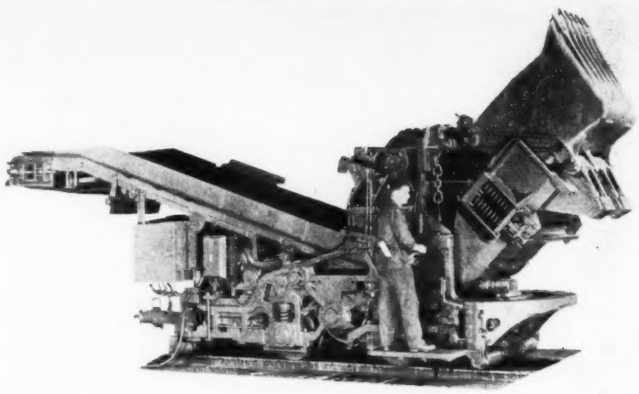
Personnel

Field operations for Western Contracting Corp. were under the direction of Project Manager C. W. Barnhart. Other key men included Gene Williams, Chief Engineer; D. M. Costner, Grading; Alf Henderson, Structures; Ted McDaniel, Powder and Drilling; I. L. "Speck" Vinson, Lining and Trimming; Henry Johnson, Master Mechanic; and G. H. Keister, Office Manager.

The project was designed under the general supervision of L. N. McClellan, Chief Engineer of the U. S. Bureau of Reclamation. Michael W. Straus is Commissioner of Reclamation.

New Mucking Machine

A mucking machine with large capacity, designed for work in large tunnels, has been announced by Goodman Mfg. Co., 4834 S. Halsted St., Chicago 9, Ill. The Type 100 Conway is built to handle bulky, heavy loads in tunnels as large as 25 x 30 feet. It embodies the principal design features of the entire Conway shovel line, except for the increased capacity.



The Type 100 Conway mucker is built to handle bulky, heavy loads in tunnels as large as 25 x 30 feet.

The mucker has a dipper capacity of one cubic yard; with 6 loading cycles per minute, it will pull out approximately 162 cubic feet per minute. Its tramming speed is 180 feet per minute forward, and 123 fpm reverse. The main motor is rated at 100 hp, the rear conveyor motor at 30 hp. Magnetic control is furnished for either alternating or direct current. The magnetic starter is of the remote-control type, the push-button station being located near the shovel operator's position.

Detailed information on this unit may be obtained from the company by requesting Bulletin CL-491. Or use the Request Card at page 16. Circle No. 351.

Hard-Facing Guide for Parts

A rod-selection guide for Amscoating with Amsco hard-facing products has been released by American Manganese Steel Division, American Brake Shoe Co., 395 E. 14th St., Chicago Heights, Ill. The chart is arranged first according to basic operations, and then according to the equipment parts (teeth, rolls, gears, blades, etc.) that can and should be hard-faced for longer life. It covers equipment used in the materials-working, mining and excavating, crushing and pulverizing, materials-handling, and power-transmission fields. The guide gives the name of the part, the recommended rod, sizes, and method of application. It also describes briefly each rod in the Amsco line.

This literature may be obtained from the company by requesting Bulletin SG, or by using the Request Card at page 16. Circle No. 343.

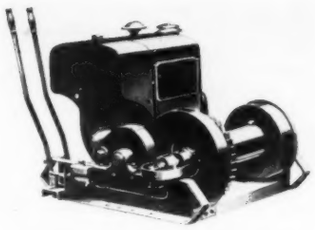
Clark Is Chief Engineer

Neil M. Clark is named Chief Engineer for the Wilson-Albrecht Co., Inc., Minneapolis, Minn., manufacturer of Waco steel scaffolding equipment. Mr. Clark, who will make his headquarters at St. Louis Park, Minn., joined the company in 1948 and, until his present appointment, was Manager of the Elyria, Ohio, plant.

New Hoists Feature Hydraulic Control

A series of hydraulically controlled hoists has been introduced by King Mfg. Corp., 3138 W. Chicago Ave., Chicago 22, Ill. Hoisting control is obtained through the use of an oversize hydraulically operated clutch. External contracting 3-inch band brakes are designed to give safe stopping power. Automatic safety ratchets used in conjunction with the brake are standard on all models.

The Model 2500-H has a capacity of 6,000 pounds at 100 fpm and is powered by a 25-hp Wisconsin gasoline engine. Model 1300-H has a capacity of 3,000 pounds at 100 fpm, and is powered by a 13-hp Wisconsin gasoline engine.



The King Model 1300-H hydraulically controlled hoist has a capacity of 3,000 pounds at 100 fpm. It is powered by a 13-hp Wisconsin gasoline engine.

Both models have a wide range of speeds and capacities.

All units are equipped with anti-friction ball and roller bearings. Multiple-drum units having ample space for wire rope are available at additional cost. Gasoline, electric, and diesel-power units can be used with the King frames. The hoisting frames can be purchased separately.

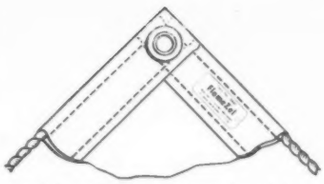
Further information may be secured from the company by requesting Bulletin No. 450. Or use the Request Card at page 16. Circle No. 310.

Improved Tarpaulins

Extra strength has been built into FlameZel tarpaulins by H. Wenzel Tent & Duck Co., 1035 Paul St., St. Louis 4, Mo. It is obtained by binding heavy-duty rope in the hem pocket all around the edges to prevent rips and tears.

Also, the tarps are now permanently numbered at the factory. Serial numbers are embossed on metal nameplates which are riveted in the hem at the corner of the tarp for easy identification.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 361.



Metal nameplates and rope bound into the edges give FlameZel tarpaulins new identification and strength features.

Multi-Use Tractor Has 4-Wheel Drive

Quick, easy, flexible operation is the prime feature of the new heavy-duty 4-wheel-drive tractor announced by National Implement Co., 62 William St., New York 5, N. Y. The unit is designed to contain many features of both wheel and crawler-type tractors. Powered by a 48-bhp Chrysler engine, it can turn around in less than its own length, utilize implements and attachments at either the front or rear end, and travel on steep and rocky hills and wet and muddy bottomlands.

The Power Horse tractor can turn in less than its own length, use implements at either end, and travel rocky hills or muddy bottomland.

The flexibility of the Power Horse is gained by substituting an independent axle for each wheel, in place of a straight-through axle. Driving impetus comes through high-speed heavy-duty truck-type roller chains housed and running in oil, uniting each front wheel with the corresponding rear wheel—the pair moving in tandem. The chain on both sides is impelled by an operating arm extending through the steering clutches.

The steering mechanism is a combination multiple-disk clutch with planetary gear. This permits changing from forward to reverse without using the gearshift. It also permits almost any degree of turn dictated by the amount of pull on the control levers. The company reports that the Power Horse can turn around in a 60-inch outside radius. The new type of transmission permits steering by reversing the wheels on one side while at the same time forwarding the wheels on the other, much like a crawler.

The tractor has 4 operating speeds forward, but can operate forward, backward, or turn around in the same gear. The reverse speed, for safety's sake, is half the forward speed. This permits a rapid shift from reverse to forward without changing gears, and enables the tractor to gain fresh foothold continuously when working in mud.

Another feature of the Power Horse is the adjustable spread, from 48 to 78 inches in 4-inch increments, in the tractor wheels. This means that the tractor can be made almost as wide as it is long. The adjustment permits a change in the center of stability, convenient for working in rough or rugged terrain. Though ordinarily only single wheels are required, dual wheels may be installed on each axle for operation under extreme conditions. Air may also be let out of the tires to increase traction for operation in quagmires or across desert sands.

The Power Horse may be used with front-end loader, bulldozer, or any of the number of farm implements. Power takeoffs are located at both front and back.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 339.

A Gas-Fired Heater

A gas-fired unit heater is announced by United States Radiator Corp., 300 Buhl Bldg., Detroit, Mich. It is available in five models wtih heat input of 55,000 to 200,000 Btu.

The heater, which is approved by the American Gas Association for natural, mixed, manufactured, and propane gas, features maximum heat transfer through the use of internal baffles and individual burners for each heat-exchanger tube, the company says.

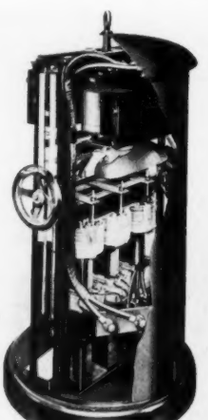
Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 360.

Heavy-Duty Welder

A heavy-duty direct-current welding machine, available in 200, 300, and 400-amp ratings, is offered by A. O. Smith Corp., 3533 N. 27th St., Milwaukee, Wis. It is said to be free of stack failure, for a high-velocity downdraft of cool air is directed over the rectifier stacks before being passed through other parts of the machine. The blast is expelled at the base to provide proper cooling and internal cleanliness.

This dc welder retains the principal construction features of the Smith heavy-duty ac welder, including a case-diameter fan and "wind tunnel" design to provide efficient air flow over all energized parts. The primary coils are raised and lowered on ball-bearing jacks.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 276.



Freedom from stack failure is a feature of this Smith heavy-duty dc welder.

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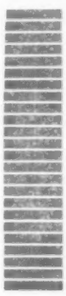

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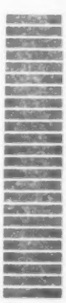

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A Water Repellent

A water-repellent coating which is said to preserve unpainted masonry surfaces such as brick, concrete, stucco, limestone, sandstone, and mortar has been developed by Preco Chemical Corp., 40 E. 40th St., New York, N. Y.

Silipruf incorporates silicone resins and can be applied by brush or spray. It does not change the color or texture of the surface to which it is applied and does not yellow with age, according to the company. Although it resists water penetration, it does not prevent the masonry surface from breathing, the company says, and thereby allows any trapped moisture to be released. Silipruf penetrates ¼ inch into the surface, and can be applied in temperatures as low as 15 degrees F.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 390.

Conveyor and V-Belts

Two bulletins, one on conveyor belts and one on V-belts, have been prepared by Manhattan Rubber Division, Raybestos-Manhattan, Inc., 92 Townsend St., Passaic 2, N. J.

The first includes complete information on the sizes, physical characteristics, and design of Ray-Man F conveyor belts for general-purpose heavy-duty service. These belts are designed for use where there is danger of tearing or puncture, where small pulleys are used, where flexibility is required, or where thick, narrow belts are needed.

The second bulletin covers the construction features and applications of the improved Condor V-belt — with emphasis on its straight sidewalls and straight-in-line cords in the strength members. It includes a table of standard industrial sizes, and lists prices.

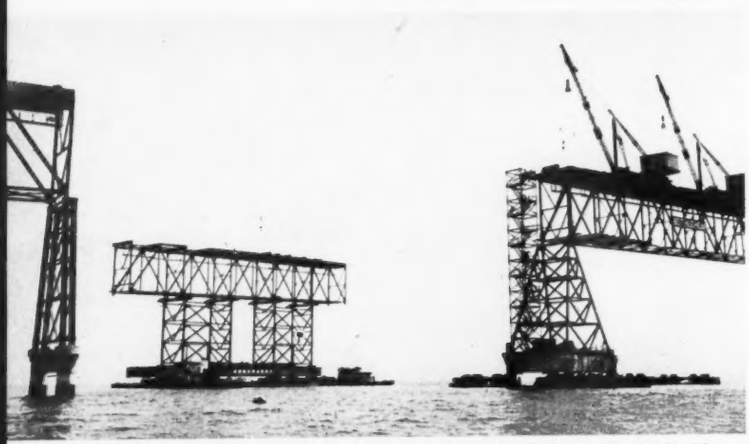
This literature may be obtained from the company by requesting Bulletin No. 6915 for information on the conveyor belts and Bulletin No. 6868-E for information on the V-belts. Or use the Request Card at page 16. Circle No. 327 (conveyor belts) or No. 328 (V-belts).

Teeth for Excavators

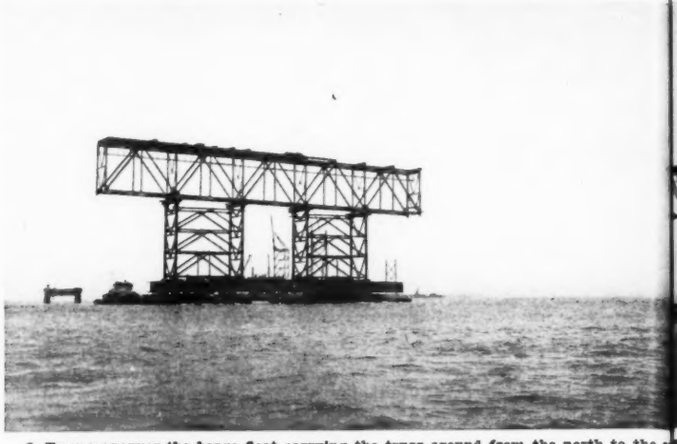
A circular displaying a full line of digging teeth for shovels, hoes, draglines, rippers, scarifiers, and trenchers is available from the H & L Tooth Co., 1540 S. Greenwood Ave., Montebello, Calif. The features claimed for H & L points include a long sharp life, no reversing, no rebuilding, and quick and easy changing.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 258.

Building the Superstructure



1. Span T9, a 300-foot-truss weighing about 400 tons, has just left the erection dock and is being moved to position between pier 19, left, and pier 20, right.



2. Tugs maneuver the barge float carrying the truss around from the north to the south side of the bridge. There wasn't enough clearance to float T9 in from the north.

C. & E. M. Photos

Truss Spans Are Assembled On Erection Dock and Floated Into Position on Their Piers; Minimum of Falsework

By WILLIAM H. QUIRK,
Eastern Editor

• CONSTRUCTION on the 4-mile-long Chesapeake Bay Bridge, being built by the Maryland State Roads Commission from Sandy Point near Annapolis to Kent Island on the Eastern Shore, got under way late in 1949. By October, 1950, work on the piers (see C&EMonthly, June, 1951, page 44) was far enough along for the superstructure to get started. Steel erection and the paving of the 28-foot roadway are scheduled for completion by July of this year. Total estimated cost of the project is $44,000,000.

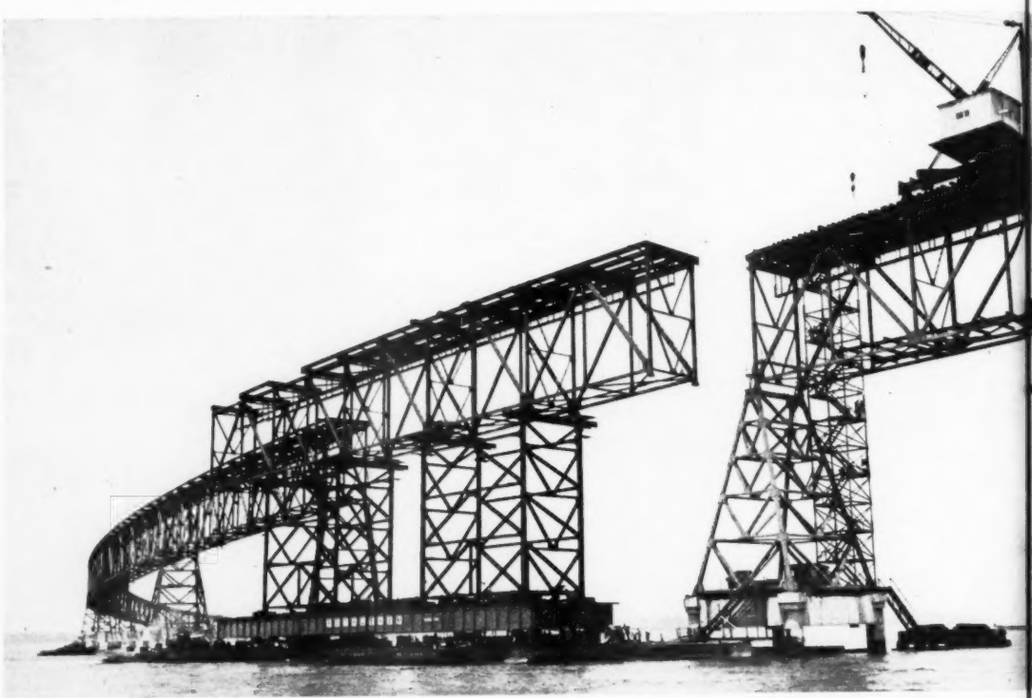
Exceeded in length by only the San Francisco-Oakland Bay Bridge in this country, the long Chesapeake Bay span will eliminate a traffic bottleneck in the ferry crossing at the same location. It will also provide a north-south route through Maryland that will by-pass congested Baltimore and Washington, as well as link the mainland of Maryland with the Eastern Shore peninsula.

J. E. Greiner Co. of Baltimore, Md., is the consulting engineer for the State on the design and supervision of construction. Five contracting firms built the substructure, which includes an abutment with 29 bents for the west approach, 57 piers, and 36 bents with the abutment for the east approach, or a total of 124 separate structures. A contract for the entire superstructure was awarded to the Bethlehem Steel Co., of Bethlehem, Pa., on a low bid of $15,953,150.95 Structural steel totals 30,000 tons.

Variety of Spans

From Sandy Point on the western shore, the spans in order across the bay include the following: 30 beam spans at 60 feet totaling 1,841.760 feet; 7 deck girder spans at 100 feet totaling 711.542 feet; 3 deck girder spans at 200 feet totaling 606.250 feet; 4 deck truss spans at 250 feet totaling 1,017.583 feet; 6 deck truss spans at 300 feet totaling 1,832.667 feet; a 3-span deck cantilever truss section totaling 1,446.250 feet, made up of a center 480-foot anchor flanked by 150-foot arms supporting a 300-foot simple deck truss on the west and a 360-foot simple deck truss on the east; a 2,922.50-foot suspension section made up of two 661.25-foot side spans and a 1,600-foot center span; a 9-span deck cantilever truss section totaling

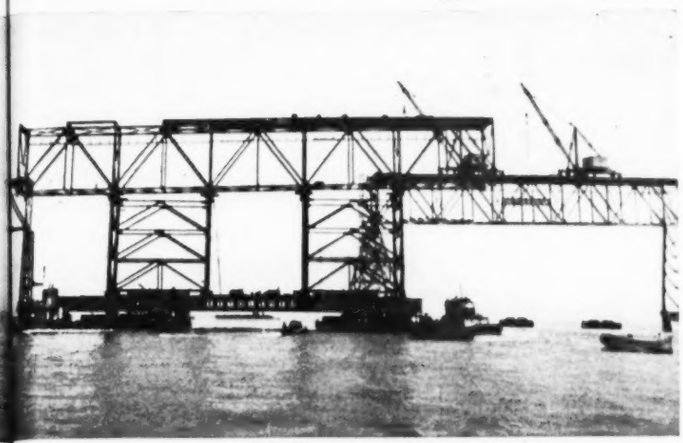
(Continued on page 20)



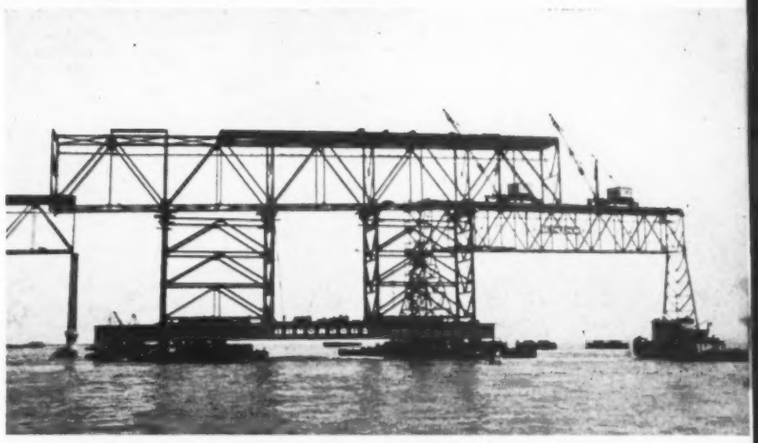
5. The gap closes at pier 20. A public-address system was a big help during these final maneuverings.

7. From the north side of the bridge, looking east: with the span in place, the barges return the falsework to the erection dock.

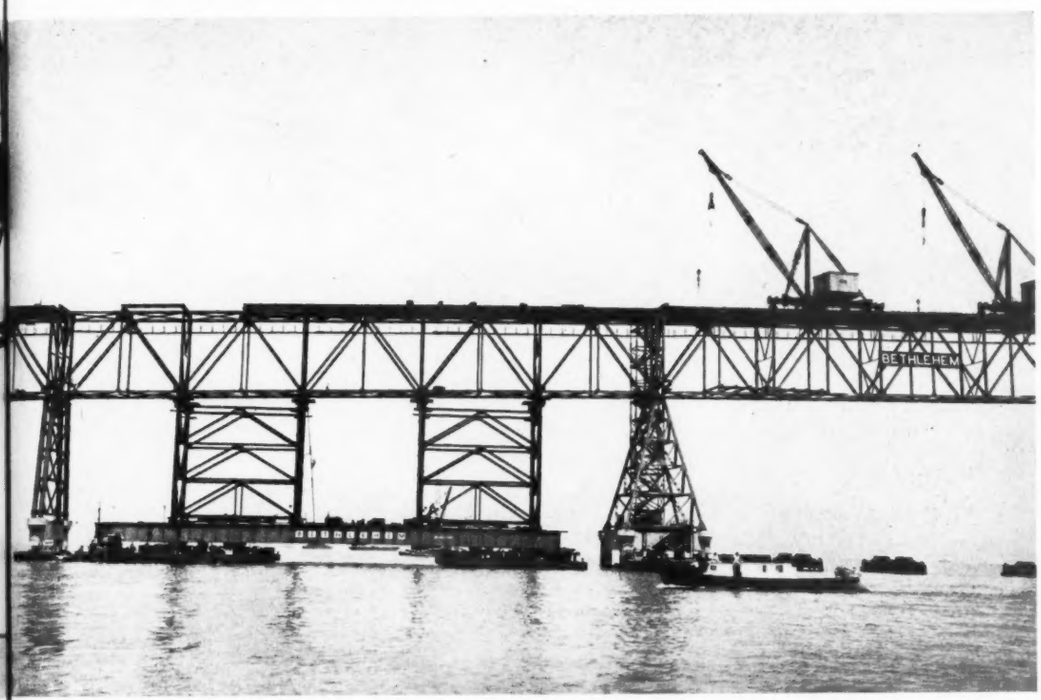
For Chesapeake Bay Bridge



ow the span moves up the bay to position. The falsework towers carry it about a foot higher than its final elevation on the bridge.



4. With float lines made fast to anchors embedded in the bay, the tugs back away. Winches on the barge will pull the float the rest of the way.



Now, a little over 3 hours since leaving the dock, the holds of the barges are filled with water to lower T9 to its seat on the piers.

3. From the north side, looking west: the barges put the girders over the dock piers so another truss can be assembled on them.

Truck Mixers and Powered Carts Deliver the Lightweight Concrete to Steel Forms for 28-Foot Roadway Deck

• THE Bethlehem Steel Co. superstructure contract for the 4-mile Chesapeake Bay Bridge includes roadway paving, but this part of the work was subbed to the Kaufman Construction Co. of Philadelphia. The roadway is 28 feet wide between curbs, and is flanked on both sides by emergency footwalks 18 inches wide, which are poured integrally with concrete parapets. Rail posts are poured in place after the deck is finished, but the walk and parapet sections are precast. A low pipe railing is constructed above the concrete parapet and posts. The bridge will normally carry two lanes of traffic, but the roadway is wide enough to accommodate three vehicles abreast if one is disabled and forced to park on the structure.

Deck paving consists of a reinforced-concrete slab, topped by a 2-inch wearing course of asphaltic concrete. Over the beam spans at the ends of the bridge, a distance slightly over ¾ mile in length, the slab is regular cement-concrete 6¼ inches thick. For the remaining 3¼ miles of deck, lightweight cement-concrete is used in the base-course slab. Slab thickness of the lightweight concrete varies somewhat with the type of span. Over the truss spans the slab is 5½ inches; over the 100-foot girders it is 5¾ inches; and over the 200-foot girder spans there is a 6½-inch deck slab.

Paving started on the west side of the bridge on April 18, 1951, where the steel erection had made the most progress. By summer, over a mile of the steel was in place out from the west abutment, giving the paving crew a good stretch of bridge on which to work. Later in the year, when the steel erection had advanced on the east side of the bridge, paving operations with another crew got under way at that end. Similar methods were used on both sides. Paving is keeping pace with the steel progress, and is scheduled for completion by the bridge opening date in July of this year.

Mixers and Powered Carts

Paving was done the full 28-foot width, one span at a time, from the high or outer end back toward shore. For the operations on the western end the concrete was supplied by the Crain Highway Corp. of Annapolis, Md., from its plant 8 miles from the bridgehead. A fleet of 5 truck mixers—Rex 3-yard Moto-Mixers and Willard mixers mounted on Fords and Macks—deliv-

(Continued on page 23)

C. & E. M. Photo

Bethlehem's derrick boat erects the side tower at pier 24 of the Chesapeake Bay Bridge.

Erecting Truss Spans On Ches. Bay Bridge

(*Continued from page 18*)

4,685.322 feet, made up of four 480-foot anchors flanked by 150-foot arms supporting one 360-foot and four 300-foot simple deck trusses; a 3-span through cantilever truss totaling 1,719.604 feet divided into lengths of 470, 780, and 470 feet—the 470-foot anchors with 156-foot arms support a 468-foot suspended truss; 4 deck girder spans at 200 feet totaling 808.667 feet; 14 deck girder spans at 100 feet totaling 1,422.042 feet; and 37 beam spans at 60 feet totaling 2,272.260 feet.

The bridge structure totals 21,286.447 feet or 4.03 miles. The shore-to-shore length, including a 1,750-foot causeway at the eastern end, is 4.35 miles. From the west abutment the bridge alignment is tangent for 3,200 feet, when it swings into a 1-degree 40-minute curve to the left for 2,870 feet. Then it straightens out for the remainder of the distance to the eastern abutment, crossing the navigation channels at right angles. Highest point on the deck is elevation 198.5, center of roadway at the midpoint of the suspension span. The grades drop off on either side—3 per cent on the west and 1.90 per cent on the east. Vertical clearance at the center of the suspension span is 186.5 feet above mean high water, while the horizontal clearance for this main navigational channel up the western side of the bay is 1,500 feet. Here the water is 50 feet in depth. Over along the eastern shore, the 780-foot through cantilever truss spans a natural channel where the bay is 90 feet deep.

This rather deep water would have made the use of falsework for steel erection both costly and difficult. Accordingly Bethlehem Steel Co. decided wherever possible to assemble the spans at a convenient location, and float the completed sections into position on the proper piers. Such a method would also eliminate considerable handling of the steel by floating rigs, using instead the faster and more flexible stiffleg travelers.

Derrick Boat

Steel for some of the inshore 60-foot beam spans was set by a truck crane working on land, while the remainder of the beam spans and all the 100-foot girder spans were placed by derrick boat. For this job a special derrick boat was designed and built. It consists of a steel hull 128 feet long x 64 feet wide, made from two barges, for supporting a triangular-shaped steel tower whose sides measure 33 feet. Atop the tower is a stiffleg derrick with its base 118 feet above the water. It has a 40-foot mast and a 90-foot beam, and is rigged with ⅞-inch wire rope through a 13-part topping falls. A 100-hp boiler drives a 4-drum hoist developing a lifting capacity of from 8 to 37 tons according to the radii.

Two of the 100-foot girder spans at each end of the bridge were purposely left open, in order that the 200-foot girder spans might be erected on top of the adjoining spans and bridging the gap between. These long spans were then floated off, and positioned over the proper piers. Additional steel was bolted to two of the 200-foot sections to provide four 250-foot members for supporting the falsework on which the trusses were later assembled.

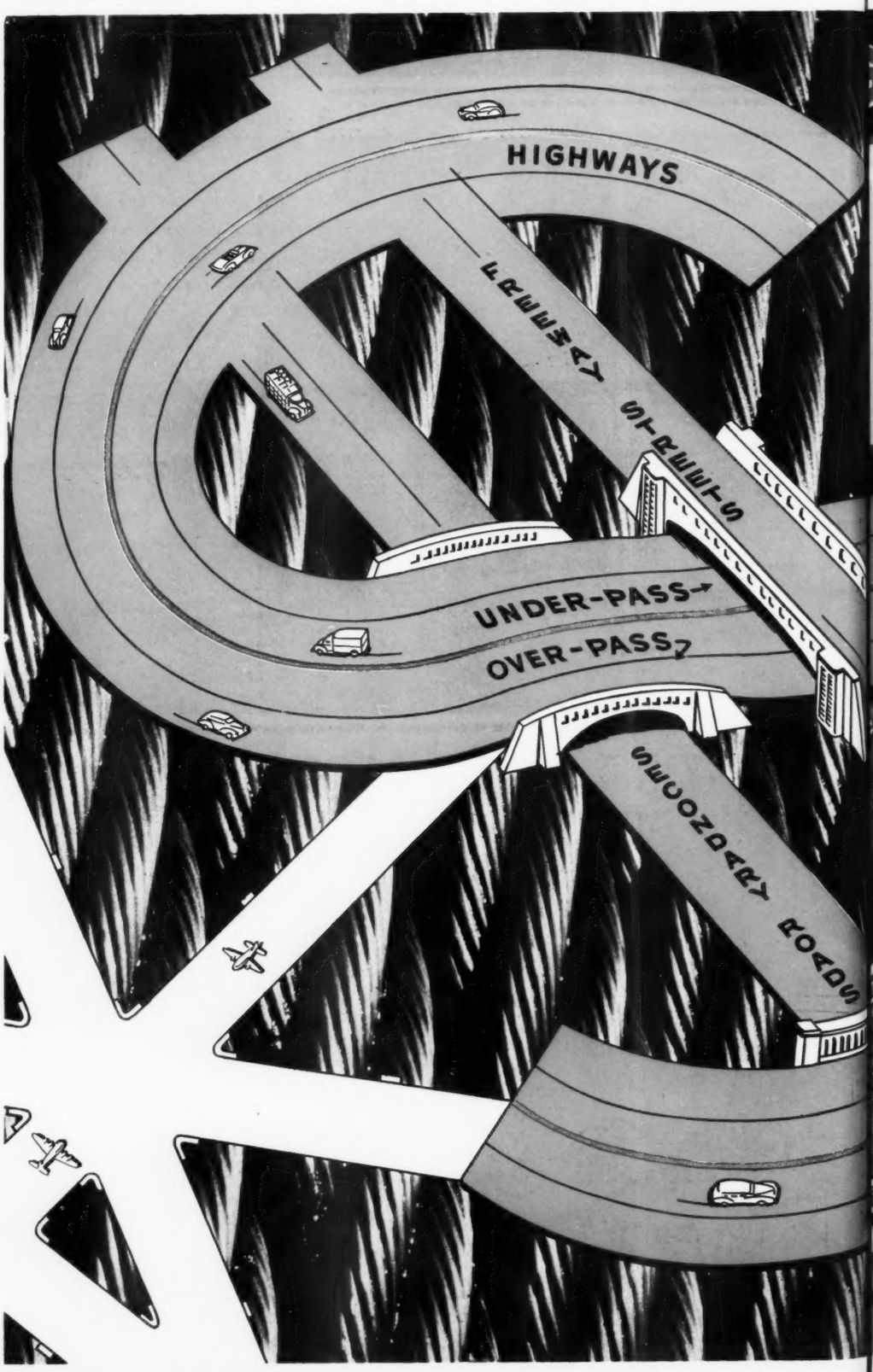
While these beam and girder spans were being placed, four bents for an erection dock were constructed approximately 70 feet north of the bridge alignment for the 300-foot deck truss span T10 between piers 20 and 21. This is the last of the ten deck trusses on the west side, and is over a mile out from shore. The bents consist of H-piles, driven deep into the sandy bottom, spaced 90, 60, and 90 feet apart. At the completion of the job, divers will burn these piles off close to the bottom of the bay. The bents support the four 250-foot girder assemblies laid like stringers lengthwise to form a dock. The 9-foot-deep girders are laid out in pairs and cross-braced, 9 feet 4 inches apart; the pairs in turn are on 28-foot centers.

Erection Dock

Supported on the heavy grillage of girders are the two steel falsework towers across which the various truss spans are assembled and tied together. These rectangular towers measure 59 feet 5½ inches lengthwise along the erection dock x 28 feet across. Their height is altered to conform with the elevations at the ends of each truss according to the bridge grades of the particular span. The falsework for T10 was put up by the derrick boat, which also erected the steel bents above the bell-type piers. This truss section of the bridge, lying between piers 11 and 21, is carried on alternate 4-bell and 2-bell piers. Thus pier 20, at the west end of the key span T10 paralleling the erection dock, is a 4-bell pier while pier 21 at the east end is a 2-bell pier.

The derrick boat erected truss T10 on the falsework towers above the erection dock. The paralleling 300-foot sides of the truss are on 23-foot 4-inch centers, and are 40 feet deep; when

(*Continued on next page*)



completed, the assembled span weighs more than 400 tons. The entire assembly—girders, falsework towers, and truss—was then floated off the dock onto four steel barges measuring 128 feet long x 32 feet wide. The scows were fastened together into pairs with beams welded or bolted transversely onto the deck, permitting each 64-foot-wide craft to slip through the 90-foot spans at the ends of the erection dock. The barges were thus crosswise of the truss they were carrying.

This initially assembled truss was then floated off the barges to its permanent position spanning piers 20 and 21. Next the derrick boat placed two Bethlehem stiffleg travelers on top of the truss, which has a top chord elevation of 136 at the west end and 145 at the east end. These travelers, which were reached by stairs built up from the 4-bell pier 20, have 90-foot booms, a 35-ton lifting capacity, and are equipped with Twin Disc Clutch torque converters in order to maintain a smooth, steady lift when hoisting structural-steel members from the supply barges to the truss being assembled. The steel was fabricated at the Pottstown, Rankin, and Bethlehem works and loaded to scows from cars at Pennsylvania Railroad pier 11 and Western Maryland Railway pier 6 in Baltimore.

Floating in the Spans

From their elevated perch, the two stiffleg travelers were scheduled to assemble and erect a total of 20 truss and cantilever anchor spans over the adjoining temporary erection dock. One by one as the trusses were completed, they were floated off and placed in their permanent position on the respective supporting piers. The remaining nine trusses on the western side of the bridge from pier 11 to pier 20 were erected first, from the inshore span outward.

Later, another falsework bent was driven at the erection dock to accommodate the longer 480-foot trusses for erection in the same manner. The girders, however, that served as cribbing or lower falsework for the spans up to 300 feet, were replaced by one of the trusses which in turn supported the truss being erected. It was planned to erect four of the longer spans with a traveler and a derrick boat; the 780-foot main span of the through cantilever truss with a high derrick boat; and the three 600-foot cantilever and suspended spans with high derrick and one traveler.

C. & E. M. Photo

Chicago booms erect steel for the main tower at pier 25, the suspension span of the bridge.

The C&EMonthly camera was on hand for the floating in of span T9—a 300-foot truss, 40 feet deep, and weighing about 400 tons. The operation, typical of all the other spans, took a little over three hours from the time the barges left the erection dock until the truss was secured to the piers. Span T9, between piers 19 and 20, was the last of the ten deck trusses on the western side of the bridge to be erected. Adjoining it to the east is the span supporting the pair of travelers—the first truss to go up.

Precise Work

Cantilever spans were brought in from either side of the bridge, depending on the movement of the tides. Spans T1 to T8 and T10 were all floated in from the north. T9 was floated in from the south because it was a closing truss and the curve of the bridge prevented its being floated in from the north—not enough clearance. Water was pumped from the holds of the twin pair of barges moored between the bents at the ends of the erection dock, and the resultant greater buoyancy lifted the weight of girders, falsework towers, and truss off the bents, making the entire structure water-borne. Two powerful tugs, hired from the Curtis Bay Towing Co. of Baltimore, maneuvered the float around from the north to the south side of the bridge, then straightened it out so as to bring it into the gap between the piers.

For this particular truss, the falsework towers were about 61 and 70 feet high at the west and east ends respectively to conform with the grade on the bridge. On the float the truss was about a foot higher than the final elevation to which it was positioned on the bridge. When the tugs pushed the float nearly up to the piers, lines were made fast to anchors embedded in the bottom of the bay north of the bridge. Floating buoys marked the position of the anchors, enabling them to be easily picked up and moved about. Once the barges were secured to the anchors, the tugs backed off, and the winches on the barges pulled the float the rest of the way in to the piers. Some small final adjustments were made with chain hoists.

When the horizontal alignment was satisfactory, the holds of the barges were slowly filled with water, thus lowering the truss down to its seat on the piers where it was secured in place. Then the float with the girders and falsework towers was towed back to the erection dock where another truss would be assembled.

(Concluded on next page)

Erecting Truss Spans On Ches. Bay Bridge

(Continued from preceding page)

Of great help in communicating throughout all this careful precision work was the Motorola FM two-way radio system consisting of 12 sets. Telephone units were installed in the office on the western shore, in the tugs and personnel boats, and on several of the key piers. During the final maneuvering of the float, Bethlehem's erection foreman from his position on the girder falsework grillage directed the operations through a public-address system. A whaleboat was always standing by, as a safety measure, to pick up any workers who might fall overboard.

Chicago Boom

While the various truss spans were being placed, the contractor was also engaged in erecting the two side towers and the two main towers for the suspension span, using a combination of the tower derrick boat and a pair of Chicago booms. The top of the main cable towers is at elevation 354 above mean low water. These tall towers are made up of 12 vertical sections for each leg, of which the lower 6 were erected by the derrick boat. The upper halves of the towers were erected with the two Chicago booms, one working on each leg. This method was found to be simpler and faster than employing the conventional creeper travelers, commonly used in straight vertical erection.

Completely fabricated sections of the legs, 20 to 30 feet in length, were barged out to the piers. The Chicago booms erected alternate sections of the two legs, keeping one leg a section higher than the other. The booms were also used for jumping each other up the tower, two sections at a time. The booms are 100 feet in length, and weigh about 22 tons.

Work on the suspension span itself was scheduled to get under way in the late fall of 1951. In preparation for the cable spinning the contractor moved the necessary equipment and materials out to the west anchorage pier 23. From pier 23 the cables extend to side-tower pier 24, the two main towers 25 and 26, the other side-tower pier 27, and on to the east-anchorage pier 28.

All steel is given a shop coat of red lead paint before it leaves the fabricating shop, and another coat of red lead before leaving the shipping yard at Baltimore. After erection, the members get two coats of aluminum paint.

Personnel

Bethlehem Steel Co. has an average force of 150 on the Chesapeake Bay Bridge project, and is represented at the site by Tom M. Martinsen, Resident Engineer, and Oskar Brunn, Foreman.

For the J. E. Greiner Co., Consulting Engineer, Bruce Herman is Resident Engineer.

The Maryland State Roads Commission is headed by Russell H. McCain, Chairman, with W. F. Childs, Jr., Chief Engineer.

ARBA Anniversary

The American Road Builders' Association will hold its Golden Anniversary Meeting at the Rice Hotel, Houston, Texas, on January 21-24.

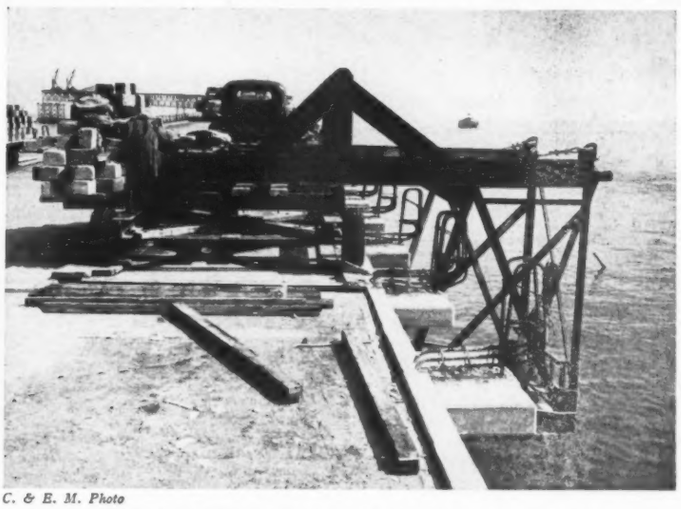
The four general sessions will deal with such questions as state highway department problems; Federal Aid for highways; legislation on highway financing; the economics of expressways between urban areas; civil airports and highways in national defense; pavement-loading tests and weight limitations; and the steel shortage, with its attendant problems of allocation and control and the drive for scrap.

Divisions holding special meetings include County and Local Roads; Municipal and Airport; Contractors; Manufacturers; Educational; Materials and Supplies; and Pan American. Committees that will meet include those on clearing and grubbing; various kinds of soils stabilization; highway engineering; and resolutions. There will also be a "County Potpourri" and an open evening for delegates' individual activities. Social events will include two luncheons on January 22 and 24, and a reception and banquet on January 24.

Official nominations for 1952 ARBA officers and for directors for 1952-53 are as follows. For President: Paul B. Reinhold, President, Atlas Equipment Corp., Pittsburgh, Pa. For Vice Presidents: Charles M. Noble, Chief Engineer, N. J. Turnpike Authority, Trenton, N. J.; Charles W. Smith, President, Smith Engineering & Construction Co., Pensacola, Fla.; M. J. Hoffmann, Minnesota Commissioner of Highways, St. Paul, Minn.; A. Diefendorf, Head, Department of Civil Engineering, University of Utah, Salt Lake City, Utah. For Treasurer: Jennings Randolph, Assistant to President, Capital Airlines, Washington, D. C. For Directors: Paul L. Andrews, Executive Secretary, Georgia Highway Contractors Association, Inc., Atlanta, Ga.; Bernard E. Gray, President, The Asphalt Institute, New York, N. Y.; T. B. Hale, Vice President, International Harvester Co., Chicago, Ill.; J. E. McCracken, Sales Engineer, Bethlehem Steel Co., Bethlehem, Pa.; Robert M. Reindollar, Consulting Engineer, Baltimore, Md.; Charles H. Sells, Consulting Engineer, New York, N. Y.; Paul B. Rynning, County Engineer, Jackson County, Medford, Oreg.

C. & E. M. Photo

A Kal-Truk dumps concrete to a deck form of the Chesapeake Bay Bridge.



C. & E. M. Photo

Here's the rig Kaufman Construction Co. used to dismantle forms for the deck pours. Notice the heavy counterweight over the inner wheels of the carriage.

Lightweight Concrete Used on Bridge Deck

(Continued from page 19)

ered dry batches to the site, where water was admitted to the drums. Mixing time averaged 5 to 6 minutes.

From the truck mixers the concrete was discharged into a fleet of 5 Kal-Truks—rubber-tired powered carts with a ½-yard capacity—that carried the material to the forms. Thus six cart loads emptied one of the truck mixers. All the concrete for the bridge deck—2,440 cubic yards of regular concrete and 8,720 cubic yards of lightweight concrete—will be handled in this manner. The double mat of reinforcing for the slab totals 1,711 tons, and was supplied by the Bethlehem Steel Co.

Solite was used for the aggregate, both fine and coarse, in the lightweight concrete, with the coarse material being graded from ¾-inch down to No. 4, and the fine material passing the No. 4 sieve 100 per cent. Made from burned slate, the Solite was shipped by rail to the batch plant from the Southern Lightweight Aggregate Corp. in Richmond, Va. North American portland cement, supplied by the Hagerstown, Md., plant, was used in the mix. The weights of a typical 7½-bag batch of lightweight concrete were as follows:

Cement	705 lbs.
Solite, fine aggregate	1,270 lbs.
Solite, coarse aggregate	775 lbs.
Water (42.4 gals.)	353 lbs.
Total	3 103 lbs.

The water-cement ratio was 5.65 gallons to the bag, and the slump averaged between 3 and 5 inches. There was no air-entrainment, and the concrete developed a strength of 3,500 psi at 28 days. When dry, the weight of a cubic foot of the lightweight concrete is 105 pounds, or nearly a third less

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Lightweight Concrete Used on Bridge Deck

(*Continued from preceding page*)

than the weight of regular concrete, which averages around 150 pounds when the aggregate is sand, gravel, or crushed stone.

Steel Forms

Where the spans of the superstructure carried only four steel stringers or girders, plywood forms were used for the deck slab. Panels were supported on 2 x 8's laid out transversely between the stringers and supported by special bolts and nuts to the upper flange of the steel beams. But where the superstructure had five stringers or beams, which was the design for about 70 per cent of the bridge, Bethlehem steel forms were used.

They were especially constructed for this job in the shape of a rectangular box 6 feet 6 inches long x 10 inches wide x 3 inches deep. The light metal boxes were laid out transversely between the stringers, and bolted flush with the underside of the upper flange. After a pour they were easily dismantled by removing the bolts—the nuts remained in the slab—and dropping the box sections onto a platform suspended beneath the deck. The platform was part of a dismantling rig that rolled along each side of the deck on a 4-wheel carriage. Steel arms from the carriage cantilevered out over the sides to support the platform which was raised and lowered to the desired working height with Beebe 5-ton hoists. Heavy counterweights placed over the inner pair of wheels resisted any overturning moment.

C. & E. M. Photo

A Kal-Truk returns, empty, down the 6-foot-wide wooden runway over the deck forms.

Wooden runways were built over the forms on which the Kal-Truks operated when hauling concrete from the truck mixers. The runway was 6 feet wide, and cut up into sections that were easily handled by two men. Turnouts, also 6 feet wide, were provided at frequent intervals. They were long enough to accommodate two or three carts on their way back to the truck mixers, permitting loaded carts to pass on their way to the forms. Where the concrete was being placed, several of these runway sections were spread out across the deck to serve as a dumping platform for the powered carts. They were easily moved ahead as the concrete work advanced.

Transverse Supports

The wooden runway was supported on a series of double 3 x 6's laid transversely across the bridge on approximately 6-foot 6-inch centers. At the sides of the deck ½-inch bolts suspended from the double 3 x 6's supported the double 2 x 4's that sustained the forms for the bridge railing. Across the deck the transverse supports rested on precast concrete blocks laid on top of the stringers. These blocks were cast with the same concrete mix used in the deck pours to the exact thickness of the slab. They were not removed, but were left embedded in the concrete.

As the concrete was placed in the deck it was vibrated with a pair of Maginniss Hi-Lectric vibrators, one working on each half of the 28-foot deck. An Electric Products 2-kw generator supplied current for the vibrators. The concrete was screeded off by hand, using screeds long enough to cover the area between the stringers. Screeds were made of 2-inch dressed planks with an aluminum channel section over the working face, and were shaped to conform with the 1¾-inch center crown of the roadway. They were pulled along on screeding strips laid over the stringers, thus insuring that the proper depth of concrete was maintained. The inside strips were pulled as soon as the concrete was screeded, but the outside screeding strips were left in place until the forms were removed.

The concrete slab was cured with American Bitumuls emulsified asphalt applied with a Thompson spray machine. Spraying was done as soon as the free water had evaporated from the surface of the concrete. This was generally pretty rapid, due either to the sun beating down on the exposed bridge or to the steady breeze blowing over the bay. The outer edge of the slab, however, which will be exposed, was cured with burlap and water rather than with the bitumen.

A slab for a 100-foot span was poured in from 4½ to 5 hours. After a span was finished, the runway was left in place down the middle for the carts to use in pouring the next slab farther out on the bridge. As soon as the concrete had attained the required strength, the runway was picked up from its position over the precast blocks, and the carts proceeded to operate over the slab.

In paving from the east side of the

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bridge, the truck mixers from the Crain Highway Corp. were loaded at the company's batch plant in Chester, Md., on the Eastern Shore, a 3½-mile haul from the east abutment. The bituminous surface course, totaling 6,912 tons for the entire bridge, will be laid in 1952 to the required 2-inch thickness.

Personnel

The Kaufman Construction Co. has employed an average force of 100 men on the bridge-paving operations under the supervision of R. Edward Nelson, Superintendent.

For the J. E. Greiner Co., Consulting Engineer, Bruce Herman is Resident Engineer.

The Maryland State Roads Commission is headed by Russell H. McCain, Chairman, with W. F. Childs, Jr., Chief Engineer.

A New Sling Handbook, Riggers' Manual Offered

A 48-page "Sling Handbook and Riggers' Manual" has been compiled by the technical staff of Union Wire Rope Corp. It illustrates 11 slings and fittings and covers dimensions, weights, and safe working loads. Some 30 drawings of sling uses help the reader select the proper type for each job. The new booklet offers valuable information on the care of slings, and shows the methods of factory fitting and packaging. It includes information on braided-wire fabric for those who maintain rigging lofts.

Combined with the sling handbook is a comprehensive riggers' manual. It gives step-by-step instructions on wire-rope splicing, covering the correct methods of making, serving, and seizing regular and rolled-in-eye splices; making an endless or long splice; and splicing preformed, Lang-lay, and 8-stranded wire rope. Data on efficiencies of wire-rope attachments and illustrated directions for attaching sockets or ferrules are also included. The back cover shows the standard hand signals to be used in operating overhead traveling cranes and locomotive cranes, and whistle signals for cranes and derricks.

This literature may be obtained from Union Wire Rope Corp., 2260 Manchester Ave., Kansas City 3, Mo., or by using the Request Card at page 16. Circle No. 354.

Jumbos in Several Styles

One of two Rogers jumbos recently placed in operation at an underground iron mine in Missouri is shown in the accompanying photograph. It has two hydraulic jib arms with a self-leveling operator's platform, independently driven tracks, a mast platform adjustable at any height, and electric-motor drive. The mast folds to enable the jumbo to pass through a 15-foot entryway.

Bulletin 51-3 illustrating other Rogers jumbos can be secured from Rogers Iron Works Co., 11th and Pearl Sts., Joplin, Mo. These machines are available with stationary masts, pivoted booms, jib arms mounted directly on the crawler chassis, and with air or diesel-engine drive. They can be used for drilling, powder loading, scaling, roof bolting, etc. All models can be disassembled into components for entrance through shafts.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 278.

This Rogers folding-mast jumbo features two hydraulic jib arms with a self-leveling operator's platform. The mast platform is adjustable.

Safety Torch for Road Work

A circular prepared by McCloskey Torch Co., Edison Bldg., Toledo 4, Ohio, highlights a safety torch designed to mark road and construction-job hazards. Features of the unit include 13-gage-steel construction, 8-pint capacity, performance under all weather conditions, and self-righting when knocked over.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 303.

Preco Back-Rippers welded into angling-blade dozers rip only when the tractor backs up; they float on top of the ground when it moves forward.

Rippers Welded Onto Angling-Blade Dozers

Rippers for angling-blade bulldozers are available from Preco, Inc., 6300 E. Slauson Ave., Los Angeles 22, Calif. Four of them are welded to the underside of the dozer C-frame; this permits their use irrespective of the angle of the blade itself. The teeth float on top of the ground when the tractor moves forward, and automatically dig and rip when the tractor backs up. Thus the dead-head back-up time becomes a profitable operation, Preco says, while the blade can make a full load on each forward trip. When desired, the teeth can be locked up out of the way.

Preco claims that its Back-Rippers can rip out rocks, roots, shale, and other material in a single back-up pass.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 263.

Booklet on Welding Designs

A 20-page illustrated booklet, "Improved Design for Welding", has been announced by Linde Air Products Co., Division of Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y. It describes economies of Unionmelt and Heliarc processes and gives suggestions for welded design for the engineer's notebook.

It includes reprints of the papers "Plan Not Little Things" by G. F. Nordenholt, Editor of *Product Engineering*, and "Applications of Welded Design for Cost Production" by R. H. Bennewitz of Linde Air Products. The booklet also contains a summary of standard welding symbols abstracted from the "American Welding Society Summary of Standard Welding Symbols".

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 309.

Lays Bituminous Paving

A 4-page catalog describing a spreader designed to lay stone, gravel, shale base, and hot or cold asphalt mix has been prepared by I. J. Overman Mfg. Co., Box 203, Marion, Ind. Photos illustrate its use on state, city, and county work. The company also suggests its use for parking lots, driveways, etc.

Complete specifications are given for the unit, which is available in three models covering a range of laying widths from 4 to 11 feet. Special features of the units, standard and accessory attachments, and testimonials of users are presented in the bulletin.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 320.

Roadsides, Median Get Cover of Green

Sodding for Center of Parkway and Outside of Shoulders; Rest of Area Bordering Pavements Is Seeded and Mulched

C. & E. M. Photo

Subcontractor Les Haynes cuts sod for use along a highway near Terre Haute, Ind. He uses his own shop-made sod cutter, powered by an air-cooled Wisconsin gas engine.

• A GOOD example of the "complete" highway may be found on a new 2.6-mile stretch of dual roadway on U. S. 41 and 150 at the south edge of Terre Haute, Ind. The State Highway Commission of Indiana has improved the southern approach to the city on the banks of the Wabash by constructing, on new location, a reinforced-concrete highway with two 22-foot pavements separated by a 50-foot parkway. The original road, ½ mile to the east, was overloaded, with only two lanes of pavement for the heavy traffic it carried.

The new project is the first of four sections of 4-lane divided highway north for 2.6 miles into Third Street, Terre Haute. Several sharp turns are eliminated with this straightaway alignment on new location. Direct access is also provided to the Vigo County fair grounds along the western side of the new route.

Construction got under way in August, 1950, after the State Highway Commission awarded a contract for the work to the Rieth-Riley Construction Co. of Goshen, Ind., on its low bid of $437,883.79. Practically all the grading was completed in the fall of 1950 to permit paving to start on May 8, 1951. By early July the paving was finished, and the entire project was turned over to the State by the end of August.

The 22-foot pavement on each side of the roadway has a 9-7-7-9-inch cross section, with the depth increased from 7 to 9 inches in the outer 2 feet along the edges. Contraction joints occur at 40-foot intervals, and expansion joints are placed only at the crossovers connecting the two pavements. Along the outside lanes are 11-foot shoulders sloping down from the concrete at the rate of one inch per foot. Sideslopes are either 4 to 1 or 2 to 1. The 50-foot-wide center parkway dividing the dual highway is depressed, the depth varying slightly according to the topography. At the low points are drop inlets which drain off to the sides through lateral connections.

Sodding and Seeding

Rieth-Riley Construction Co., the prime contractor, sublet to Les Haynes of Morgantown, Ind., the work of curing the concrete pavement, and the contract items of sodding, seeding and mulching, and plain seeding. Curing was accomplished by covering the fresh concrete with burlap which was removed the morning following the day's run. This was replaced with a layer of straw that was wet down and not removed for 7 to 14 days, depending on the weather, or until the concrete had attained a strength of 552 pounds (modulus of rupture) per square inch.

The other items in the subcontract included 22,000 square yards of sodding; 160,000 square yards of seeding and mulching; and 3 acres of plain seeding. Most of the sodding included an 8-foot-wide strip along the ditch line at the center of the depressed parkway, and a 32-inch strip along the outside of each shoulder at the break line to the slope. Sod was also placed around the headwalls of culverts, and at driveways bordering the highway.

Shop-Made Sod Cutter

Les Haynes made arrangements with nearby farmers to cut sod from pasture lands or from fields that were currently not under cultivation. He used his own shop-made sod cutter, a machine powered by an air-cooled Wisconsin gas engine. The self-propelled mechanical cutter, working in parallel rows, cut the sod into strips 16 inches wide x 32 inches long, to a depth of 1½ inches. The strips were then picked up,

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Roadsides, Median Get Cover of Green

(*Continued from preceding page*)

loaded on trucks, and hauled to the job, where they were placed by hand. Sodded areas were kept wet for seven days, and the contractor was required to replace any sod that failed to take root within 30 days.

Complete Cover

The remaining width of shoulders, the depressed parkway, and all cut and fill slopes were seeded and mulched. In addition, flat areas beyond the toe of slopes included within the right-of-way lines were seeded without being mulched. Thus the entire width of highway was given a complete cover of green, removing all the grading scars of construction and providing a check on erosion.

The prime contractor prepared the seedbed for the roadside landscaping with a disk harrow mounted on a Fordson tractor, and a Ferguson spring-tooth harrow. From that point the subcontractor took over. Seed was sown with a hand seeder in swaths 8 to 10 feet wide at the rate of 50 pounds of seed per acre. Areas of ½ acre were marked off at a time so that the rate of distribution could be more accurately determined. Foster Kendall of Carmel, Ind., supplied the seed, which contained 40 per cent Kentucky bluegrass, 40 per cent perennial rye, and 20 per cent redtop.

Armour's Big Crop fertilizer, supplied in paper bags from the Jeffersonville, Ind., plant, was then spread over the ground at the rate of 600 pounds per acre. The fertilizer was a 10-6-4 mix containing 10 per cent of nitrogen; 6 per cent available phosphoric acid; and 4 per cent potash. On this job the material was put on both by hand and with a lime spreader.

One small yet beneficial touch, not specified but added at the volition of the contractor, was the sowing of oats along a narrow strip of shoulder bordering the concrete pavement. The oats sprang up remarkably fast and, after the mulch was put on, served to hold the straw in place over that area especially subjected to the strong air currents set up by passing cars.

Mulch Blower

Straw for the mulching was obtained from nearby farmers in 60-pound bales, and put on over the seeded and fertilized areas at the rate of 4½ tons per acre. This provided a protective mat about 2 inches thick. The entire mulching was done by machine—a Papec combined ensilage cutter and blower, powered by a Wisconsin air-cooled engine and mounted on a 4-wheel farm trailer. The unit was pulled by a GMC truck moving along the pavement in low gear as the blower shot a stream of mulch 40 to 50 feet out over the shoulders and slopes.

No stops were made for reloading. Other trucks with a constant supply of straw pulled alongside the towing flat-bed, and three or four men made the transfer speedily by hand. The same number kept feeding the straw to the machine, which cut up the longer pieces into smaller bits. One man at the rear of the trailer directed the flow of mulch off to the sides.

Following the straw blower was a 1,000-gallon Ford tank truck equipped with a 22-foot spraybar out to the side for watering the seed-fertilizer-mulch bed. A Jaeger 2-inch pump forced the water out under pressure. The length of the bar permitted wetting down of the entire center parkway seeded area from the pavement. Water was obtained from city hydrants in Terre Haute.

When the mulch was soaked there was less tendency for it to blow away, and only in a few places was a little dirt spread on over the mulch to hold it in place. One day during the course of the work, the Terre Haute area was struck by a local wind storm with gusts from 60 to 75 miles per hour. It disappeared as quickly as it came, but a section of mulch that had just been blown on was pretty well swept off into the surrounding countryside. Just one of the hazards of contracting, but the blower replaced the lost mulch quickly

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C. & E. M. Photo

A supply truck delivers straw mulch to the feeder truck while a Papec ensilage cutter and blower, mounted on the truck, shoots a stream of mulch over the shoulders and slopes.

and economically.

The roadside development items in the contract took about a month to complete, from the latter part of July to the latter part of August. Les Haynes employed an average force of 25 to 30 men on his subcontract.

For the State Highway Commission of Indiana, Jesse D. Fine was Project Engineer. The project is located in the Crawfordsville District of which J. E. Sheldon is District Engineer. Samuel C. Hadden is Chairman of the Commission and Ray H. Bower is Chief Engineer. Earl B. Lockridge is Superintendent of Maintenance, with Charles Wilson, Landscape Supervisor.

How Frost Affects Road Load Capacity

The Highway Research Board Bulletin No. 40 goes in detail into the effect of frost action on the load-carrying capacity of roads. Included in the bulletin are a progress report of the Committee on Load-Carrying Capacity of Roads as Affected by Frost Action, compiled by Chairman C. L. Motl; and a paper by Miles S. Kersten, of the University of Minnesota, and Allen E. Cox, of Groves, Lundin, & Cox, entitled 'The Effect of Temperature on the Bearing Value of Frozen Soils".

The committee report supplements previous HRB reports and includes data from the state highway departments of Iowa, Michigan, Minnesota, New York, North Dakota, and Ohio. The conclusion reached is that all types of soil are adversely affected by freezing and thawing action. In "The Effect of Temperature" paper the authors describe how the frozen stability of clay, silt loam, sandy loam, and sandy soils is affected by differences in density, moisture content, texture, and temperature. Below 32 degrees F, the bearing value increases as the temperature decreases, the order of strength from least to greatest being clay, silt loam, sandy loam, and sand. Descriptions of test procedure and equipment are included in the paper.

Both sections of the bulletin contain diagrams and tables in amplification of the text.

HRB Bulletin No. 40 may be obtained from the Highway Research Board, 2101 Constitution Ave., Washington 25, D. C. The price is 75 cents.

Highway Guardrail

Guardrail developed by Hiway Security Guard Corp., Coon Rapids, Iowa, is designed to fulfill two purposes when struck by a vehicle of any kind: to deflect the vehicle into a position parallel with the traffic lane, and simultaneously to provide an externally applied braking action to decrease the vehicle's forward speed. In over 250 deliberate test contacts with the rail at speeds up to 60 mph and angles up to 42 degrees, there were no personal injuries and little damage to the vehicle, the company reports.

A new booklet prepared by the company describes the braking and control action, and includes technical details on the construction of the guardrail and photographs of typical installations. The company manufactures the post and 6-foot rail sections. It says that installation is simple and that two coats of Corrosite Vinyl Plastic paint will give the rail a permanent finish of high visibility.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 389.

Lincoln Appointments

William Irrgang has been elected Executive Vice President of The Lincoln Electric Co., Cleveland, Ohio. He joined Lincoln in 1929 and has been engaged in various phases of plant operation in the firm. For the past six years he has been Director of Plant Engineering.

L. K. Stringham has been appointed Chief Engineer for Lincoln. G. C. Landis continues as Engineering Vice President.

Mr. Stringham has been with Lincoln since 1933 and for the past two years has been Director of Welding Development. He is a member of the company's board of directors.

Portable Electric Drills

Literature on the complete line of Superduty portable electric drills, available in 1/2, 3/4, and 1/4-inch sizes, has been prepared by Portable Electric Tools, Inc., 320 W. 83rd St., Chicago 20, Ill. The catalog sheets list principal specifications, illustrate the units, and list features. They point out that each capacity is available in a variety of speeds for various classes of service.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 319.

A water stop of Geon polyvinyl plastic is installed in forms for a dam in Central America. It prevents water leakage between concrete blocks, resists chemical action, and is easy to install.

Plastic Water Stop

A water stop made of Geon polyvinyl plastic, a product of B. F. Goodrich Chemical Co., 324 Rose Bldg., Cleveland, Ohio, is being used at the Guayabo Hydroelectric Project now under construction in El Salvador, Central America. It is said to be easier to install than types previously used in dam construction, and to provide excellent aging characteristics, resistance to the chemical action of concrete, and resistance to temperature changes that occur when concrete is poured and sets up.

L. F. Harza, President of Harza Engineering Co., Chicago, Ill., and one of America's foremost hydraulic engineers, developed the water stop. The plastic joint seal, extruded by Perfex Plastics, Inc., Chicago, is a central rib backed by U-shaped grooves and weighs 2.02 pounds per foot. The uniformity characteristic of Geon is important in extrusions of this size, Goodrich says. The finished seal is rolled into 100-foot strips which are cut to desired lengths by a saw or knife at the construction location. A typical pour at the Guayabo project is a horizontal block 50 feet square and 5 feet thick. Joining or welding the thermoplastic vinyl strips is done at the installation site by applying sufficient heat to the loose ends with an electrically heated knife or gasoline torch.

The plastic joint seal also may be used in architectural concrete structures above ground level, for joints in foundation walls or between foundation walls and floors, and for all types of hydraulic structures subject to water pressure except where shrinkage openings larger than ½ inch are expected. For construction joints where large shrinkage is expected, a seal strip of different design using the same principle is being developed. Where water pressure is not encountered, the present seal design is satisfactory even with large shrinkage, according to Goodrich.

Soon to be available are seals for concrete-pavement joints, thin architectural walls, joints where large openings subjected to water pressure are expected, and for other concrete construction uses.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 356.

Clayton Sales Managers

There have been several sales-personnel changes in various divisions of Clayton Mfg. Co., El Monte, Calif. William O. Merritt is Sales Manager of the Dynamometer Division, succeeding D. T. Ankeny who resigned to set up his own business. Mr. Merritt, who joined the company two years ago, will handle all domestic and Canadian sales and supervise the advertising activities of the division. Leo Hoban is Sales Manager of the Kerrick Steam Cleaner Division, and John J. Billman of the Steam Generator Division. Glenn R. Marshall directs the sale of Clayton equipment to Government projects.

Clayton Mfg. Co. published a 16-page illustrated brochure last November in celebration of the firm's twentieth anniversary.

Data on Automatic Welder

A catalog on automatic-welding equipment and wires has been announced by Air Reduction Co., Inc., 60 E. 42nd St., New York 17, N. Y. It describes the Aircomatic gun for manual operation, the head for automatic operation, and the wires for use with either manual or automatic equipment. Photographs and sketches of the equipment are supplemented by on-the-job illustrations.

This literature may be obtained from the company by requesting Form ADC 717, or by using the Request Card at page 16. Circle No. 255.

Lightweight Aggregate

A catalog on Coralux perlite aggregate has been prepared by F. E. Schundler & Co., Inc., 504 Railroad St., Joliet, Ill. This product may be used as an aggregate for plaster, acoustical plaster, or lightweight concrete. The bulletin outlines its special characteristics and properties which adapt it for service in various insulating and sound-absorbing uses.

Features claimed for Coralux in the catalog include light weight, fire resistance, high thermal insulation, sound absorption, crack resistance, and fast, easy finishing. Complete specifications as well as mixing and application instructions are included.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 325.

Buch Mfg. Co. makes a complete line of general-purpose and heavy-duty barrows—3 to 5-cubic-foot capacities.

Contractor Barrows

A complete line of general-purpose and heavy-duty contractors' barrows is made by Buch Mfg. Co., Elizabethtown, Pa. The barrows come in various styles and sizes, with steel or rubber-tired wheels, wood or tubular pipe handles, in capacities from 3 to 6 cubic feet.

No. 154, a 4-cubic-foot model, is designed for handling concrete and other wet loads. The tray is made of a single sheet of pressed steel with the edges rolled over and reinforced by ¼-inch steel rod. The 155 has a 16-gage folded steel tray which is both riveted and welded. The edges are turned over ¼-inch steel rod for extra rigidity. This barrow has a capacity of 5 cubic feet.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 373.

Lightweight Drills

A series of lightweight portable air drills has been announced by Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. The units feature one-piece housing for compactness and balance, a redesigned 5-vane air motor, an automatic lubricator, and a new throttle-valve design to eliminate air leakage.

The OA and OB Multi-Vane drills come in several different speeds for work up to ¼-inch capacity. Two styles of handles are available. Attachments, both straight and angle types, adapt the tools for reaming, tapping, wire brushing, sanding, screw driving, nut running, and close-quarter drilling.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 317.

Cummins Regional Mgrs.

The Cummins Engine Co., Inc., Columbus, Ind., has appointed W. G. Turner Manager of its Great Lakes Region, with headquarters at Cleveland. Mr. Turner was formerly located at Atlanta where he managed the Southeastern Region. He joined the company in 1947.

Mr. Turner's successor at Atlanta is R. P. Parshall, for the past 5 years Manager of the Milwaukee Branch, Cummins Diesel Sales Corp., Chicago. Other personnel at Atlanta includes B. C. Sears, Assistant Regional Manager, and Norman Grimes, Service Representative.

Another Cummins change is the promotion of R. F. Davis, former Assistant Regional Manager, Central Region, to Regional Manager, Cummins Eastern Region, with offices in the Chrysler Bldg., New York City. Mr. Davis, who has been with the firm since 1942, succeeds Walter N. Westland. Mr. Westland now heads Cummins Diesel of New England, Inc., with headquarters at Allston, Mass.

Weight Cutoff Control

A circular describing an "over-under" indicator and electronic cutoff control, both designed to speed up weighing operations, is available from Hardy Scales Co., 5701 Atlantic Blvd., Maywood, Calif. It points out that the indicator shows instantly any errors in weighing and helps the weighman to correct mistakes at once. The pointer can be easily seen from front or back.

An optional attachment for this unit is an electronic weight cutoff control which is said to aid positive full-range cutoff regardless of the speed at which material is weighed. The outside selector can be adjusted for varying load conditions and to compensate for material in suspension at the time of cutoff.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 331.

Company Builds on Ball Park

Stonhard Co., Philadelphia, Pa., manufacturer of building maintenance materials, plans a $600,000 one-story addition to its present offices. Site of the new 42,000-square-foot building is the old Phillies Ball Park facing on Broad and 15th Streets, Philadelphia. The section of the ground not taken up by the building will be set aside for parking.

Sponge-Iron Plant Ups U. S. Output

Field Work Paces a Design Still on the Drawing Boards to Build New Defense Plant Under a Cost-Plus Contract

By MICHAEL A. SPRONCK,
Associate Editor

Charles J. Williams, Inc., Photo

A Bucyrus-Erie dragline with a ¾-yard bucket excavates for one of the long, deep kilns of the reduction building. French drains have not yet been installed.

• A COST-PLUS contract was the obvious choice for the construction of a sponge-iron plant in New Jersey. For the owner was incorporating elaborate plant-equipment designs with those of the consulting engineer, which was time-consuming. Work was to begin immediately, and the contractor was to keep up with drawings as fast as they came off the boards. Moreover, although the project had the highest possible priority, both for plant and equipment, some of the essential materials were scarce. The contractor faced other problems, too, such as a water condition at the site, which was promptly and adequately handled by a drainage system.

Sponge iron is a material produced by the reduction of iron oxide with carbon—without melting. From it a powder is made which is used for bearings, gears, and other machine parts, and is a strategic substitute for copper, zinc, and other scarce materials. Precision castings vital to defense needs can be made from the powdered sponge iron simply by welding under hydraulic pressure.

Heretofore, iron powder has been manufactured and refined in Swedish plants and shipped to this country in finished form. Now Hoeganaes Sponge Iron Corp. is building a United States plant modeled after a Swedish prototype quite uncommon in the U. S., which will help to meet civilian and military demands. Arrangements have been made for stockpiling the basic ore on this side of a potentially submarine-ridden ocean.

In December, 1950, Edwin M. Ragold, an experienced designer of industrial buildings, was selected as consulting engineer. A month later Bryan Construction Co. of North Arlington, N. J., was awarded the general contract for clearing, grading, and erecting six buildings on a cost-plus basis. Work started in February, 1951.

The main plant is being built on a 105-acre site at Riverton, N. J., about ¼ mile from the Delaware River. (The owner also has a 1,000-foot frontage on the river itself.) The initial plant—provision is made for future expansion—covers an area of 50 acres and comprises six buildings, a storage area, an 1,800-foot retaining wall, and a railroad siding. It is adjacent to the main line of the Pennsylvania Railroad and to New Jersey Route 25, providing excellent transportation facilities.

The concentrated iron ore will be delivered by truck or rail, or both, to the storage area. From there it will go into the drying and reduction building, then to the sponge-iron preparation building, the pulverizing and crushing building, and then the annealing building. The fifth and sixth buildings will provide for miscellaneous storage and will house a modern laboratory and offices.

Clearing and Grading

Clearing was not much of a problem. The plant site was formerly a peach orchard, and a couple of Allis-Chalmers dozers made short work of the trees; a sharp undercut on the near side and a driving blow high on the trunk toppled them. A dozen or so were pushed together and burned.

The plant area fronts 1,800 feet on the railroad and is 1,200 feet deep. The surface contour rose about 16 feet from

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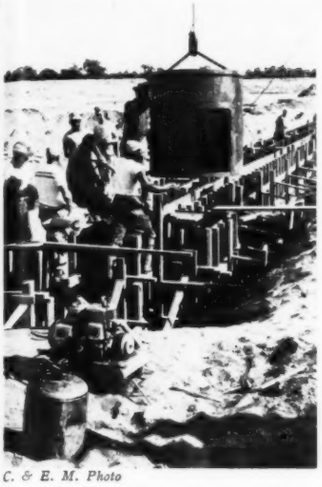


C. & E. M. Photo

A 1¼-yard Insley bucket bottom-dumps concrete to forms of the Hoeganaes sponge-iron plant.

gineer has enabled the contractor to use his forms many times over.

Forms are made up on the job, using a couple of 6-inch SkilSaws. The wall forms consist of ¾-inch exterior-grade U. S. plywood backed by 2 x 4 studs, 16 inches on centers, and double 2 x 4 wales spaced 6 inches, 1 foot 6 inches, 2 feet, and 2 feet 6 inches apart, from the bottom of the form to the top. The 3 x 8-inch strongbacks are placed 8 feet on centers and braced with diagonal 2 x 4's. Bryan is using Richmond Snap-Tys and coating all forms with Formfilm.

At the time CONTRACTORS AND ENGINEERS MONTHLY visited the job, each of the forms had been used 40 times. "We expect to use them more than that, too," said Joe Bryan, Jr. "Good wood, Formfilm, and careful handling make it possible," he said.

Three K & E transits and a Pradoni eye level were used for aligning the forms, setting grade stakes, and performing other survey work on the job.

(Continued on next page)

the front of the property to the back. The area was laid out in a 50-foot grid system and leveled to an elevation about 17 feet above mean high water of the Delaware. (The plant area and streets will be at a single elevation, which will make the plant more attractive-looking.) Grading and leveling were done with 2 Caterpillar scrapers, 2 front-end loaders mounted on Allis-Chalmers crawler tractors, a Bucyrus-Erie 22-B dragline with a ¾-yard bucket, and various tractor-dozers. Much of the material was used for filling in the water-front property and was carried there by seven Autocar trucks. Counting excavation for the building foundation, some 160,000 yards were removed. The finished ground, about 4 feet above the track siding along the front of the property, is held back by an 8-foot retaining wall 1,800 feet long.

Drainage Network

The soil in the area, a reddish sand with small quantities of clay, is very deceiving. On a nice sunny day its crust is firm, tight, and dry; but water is only 2 feet below. However, by using a system of French drains the contractor was able to lower the water table 15 feet.

A network of 8 and 12-inch Poros pipe and crushed stone surrounds each of the buildings. The laterals lead to an 18-inch Poros pipe which runs along the entire retaining wall. This in turn connects to a 24-inch RC pipe to the river. The 24-inch pipe had to be run down along the railroad tracks about ¾ mile to a point where the water-front property of the company is located.

Trench excavation and pipe setting were not easy. Because the drainage was to be all gravity flow, the system could not be many feet above river level; for this reason the trench was dug in short sections, just enough to hold one piece of pipe. Then it was backfilled with material taken from the next section. Rear-mounted tractor booms with a sling and C-clips were used for this work.

At the end of the ¾-mile stretch, a 24-inch steel pipe was pushed about 6 feet below the track and road surface. A downslope was cut into the ground at this point and the pipe was shoved through using two tractors. Six-foot lengths were welded on as the pipe advanced.

Forms Re-Used 40 Times

Spread footings are being used to support floor loads in all six buildings. They are designed for a bearing pressure of 3,000 pounds per square foot for the clayey-sand soil. Foundation walls for all buildings are of the same design as the retaining wall. This foresight on the part of the consulting en-

Sponge-Iron Plant Ups U. S. Output

(*Continued from preceding page*)

Controlled Concrete

Concrete is a 2,500-pound 1-2-3¼ mix scientifically controlled at the batch plant of the Camden Lime Co., Camden, N. J. Dehydranite 80 is used in it to add waterproofing qualities.

The Camden central mix plant is of interest because of its efficient design and operation. Situated right on the Delaware River, it receives aggregates by barge and cement by rail. The aggregates are unloaded by a 54-B Bucyrus-Erie electric-powered crane mounting a 3-yard Williams clamshell. They can be dumped directly into a 15-yard Butler hopper at dockside or stocked in one of four open bins each holding 3,000 tons of material. The hopper is fitted with a Jeffrey vibrating feeder which passes the material onto a 30-inch 171-foot-long Pioneer belt conveyor. A hundred feet above ground the material drops off the belt onto a four-spot turnhead and thence into a 400-ton four-compartment Butler bin.

A unique feature of this system is a set of 12 colored lights which show both the crane and plant operators the setting of the turnhead and high and low levels of materials in each of the four bins. The lights are actuated by high and low Bin-Dicators showing when "near empty" and "stop loading" conditions prevail. At "stop loading" there is still room for material which may be in the feeding hopper and on the belt. This duplicate signal system virtually prevents overloading or complete emptying of the bins.

Cement is fed from the bulk-cement cars to a 2,100-barrel bin by means of a conventional undertrack screw conveyor and bucket elevator. The 3-compartment bin is used for N. J. state-highway-specification cement and Types 1 and 2. City water is held in a 500-gallon storage tank.

The plant uses a system developed by Scientific Concrete Service Corp. for controlled batching of all materials. The Inspectograph of this system provides a printed record of the weights of each material and the moisture compensation made in each. The batching floor is arranged so that all operations are performed from one position. Controls for the air-operated gates are set on an operator's panel below the 4-beam Toledo scale for aggregates and the 2-beam Toledo for cement. Aggregates drop directly from the bins into the 6-yard Butler weigh hopper. The cement is fed to the hopper by one of three 12-inch screw conveyors. The screw feeds and the water valves are two-speed affairs, permitting all but the last 200 pounds to enter the hopper at high speed.

After the 45-second weighing cycle the batch is chuted to a Smith 6-cubic-yard Tilt-Mixer. Following a 3-minute mix, an air valve tilts the mixer and charges the batch into the truck waiting below. The plant has a capacity of 150 cubic yards per hour, or about 2,000 per day.

The batches are brought to the job site in agitator bodies of the Camden Lime fleet, which consists of Jaeger and Rex units, mostly 6-yard, mounted on a variety of 6-wheel trucks. One-way haul is about 13 miles. At the job, the concrete is either chuted directly into the forms or poured in from an Insley 1¼-yard bucket swung from a Bucyrus-Erie 22-B crane.

Building Design

Four of the buildings are steel-frame with bar and truss-type joists, corrugated Transite siding, and Insul-Rock roofing. The bar joists for the lab and office building are supported on a cinder-block bearing wall faced with yellow brick. The annealing building has a steel frame with steel girders and purlins. A uniform 20 x 40-foot bay spacing was used in all buildings so the contractor could order steel in advance of finished design. (There were other instances of a close relationship between designer and contractor, resulting in a lower cost to the owner.) Bethlehem 2007 long-span bar joists were spaced 34 inches on centers across the 40-foot bays. At each column line a Bethlehem 207 truss-type joist was used. Advantage was taken of continuous beam design over the columns to reduce beam sizes to a minimum.

(*Concluded on next page*)

C. & E. M. Photo

A view of the Camden Lime Co. concrete plant, with its 4-compartment 400-ton Butler aggregate bin at the top and a 6-yard Smith tilting mixer below.

Each of the 20-foot bays has a 6-foot Corolux panel to admit light. The panel can be bolted directly to the Transite, thereby eliminating structural steel at the jambs. A built-up 20-year bonded roof tops the 3-inch Insul-Rock roof planking.

The buildings are all one-story but range in height from 20 to 42 feet. Two of them have towers for interior silos. The highest of these, however, is only 57 feet and all steel can easily be placed by a truck crane.

The lab and office building has two interesting features. One is a radiant-heating system in the floor which will use the cooling water from the plant furnaces. The other is a 3 x 4-foot pipe trench just inside the walls. This will make it easy to install and repair water, electric, and other utility lines which feed the laboratory and its various work areas.

Personnel

The Camden Lime concrete plant was designed by the company president, Frank B. Hineline, and is supervised by Samuel F. Gehret, General Manager.

The contractor's forces are under the supervision of Joe Bryan, Jr., Project Manager, and Lee Franks, General Superintendent.

The sponge-iron plant is under the technical direction of P. Eg. Gummeson of Hoeganaes, Sweden, who is co-designer with Edwin M. Ragold, the consulting engineer. Mr. Gummeson is a regular commuter via the airways between Sweden and the United States. Gerald F. Finley is President of Hoeganaes Sponge Iron Corp., New York City, the owner.

With favorable weather during the winter and spring months, it is expected that the new sponge-iron plant will be completed in the latter part of this year, and operations will begin shortly thereafter.

Lane-Marking Paint

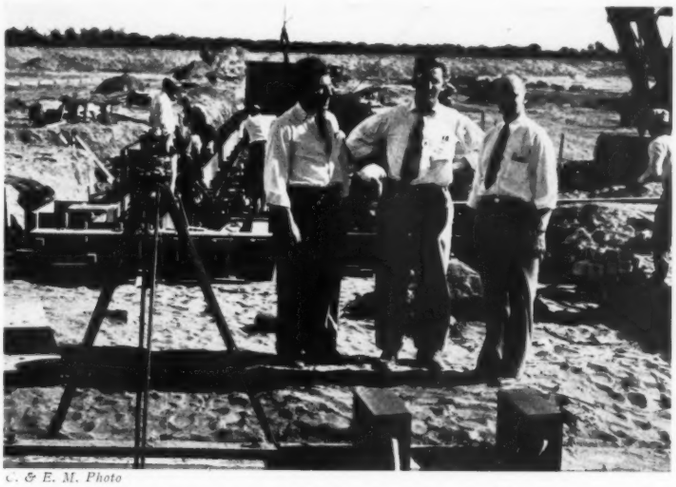
U. S. patents covering reflectorized paint for highway lane marking have been granted to Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn. The product is marketed by the company under the trademark Centerlite. It consists of a liquid containing millions of tiny glass spheres which serve as reflex-reflecting lenses. Through wear from auto traffic and weather, the tiny lenses are said to become brightly polished.

The company claims that the reflectorized stripe has long life and bright reflection, and can be seen ¼-mile away at night under auto headlights.

Welding-Accessories Catalog

A 16-page catalog on arc-welding accessories and supplies is announced by Hobart Bros. Co., Box EW-164-S, Troy 1, Ohio. It includes data on protective headshields, goggles, visors, metallic and carbon electrode holders, plugs, connectors, splicers, cleaning tools, protective clothing, and electric tools. It also lists books on welding.

This literature may be obtained from the company by requesting Catalog EW-164, or by using the Request Card at page 16. Circle No. 380.



C. & E. M. Photo

Lee Franks and Joe Bryan, Jr., left to right, are General Superintendent and Project Manager, respectively, for Bryan Construction Co. Edwin M. Ragold, right, is the consulting engineer for the project.

For Dry Digging in Wet Soil

A 20-page booklet on wellpoint dewatering has been prepared by Complete Machinery & Equipment Co., Inc., 36-40 Eleventh St., Long Island City, N. Y. A feature of the Complete wellpoint system is the patented fluted tube which provides an 8-inch drainage on a 2-inch diameter.

The booklet describes the wellpoint, jetting nozzle, riser pipe, swing joint, headers, and pumps. On-the-job illustrations show what these units can do under various working conditions. A large portion of the booklet is devoted to suggestions for installing the Complete wellpoint system. Engineering drawings illustrate layouts for use with or without sheeting and inside or outside of cofferdams. The company also highlights its free engineering service to contractors with water problems.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 289.

Welded-Bridge Contest For Steel Conservation

"Dedicated to the national interest", a 1952 award program for welded bridges makes its bow under the sponsorship of The James F. Lincoln Arc Welding Foundation. The Foundation, in opening the new award program, states that welded bridges built in the United States have resulted in steel savings ranging from 5 to 20 per cent of the total tonnage that would have been required had the bridges been riveted. It is with a view to encouraging such steel conservation in the present emergency that the Foundation sponsors the program.

All persons in the United States who feel themselves qualified to enter the contest may do so. There are 15 awards totaling $16,100. First award is $7,000; the second, $3,500; the third, $2,000; and 12 honorable mentions carry $300 awards each. Awards will be given for the best bridge designs which show weight and cost savings over comparable riveted bridges. The program allows entrants complete freedom as to size and type of bridge to be designed, since the percentage of saving is the most important factor. Closing date is July 15, 1952.

Fourteen of the nation's leading bridge engineers, of whom five will serve as jury, have formulated the rules for the program. The Chairman of the program is Professor James G. Clark of the University of Illinois. Rules may be obtained by writing to The James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio.

Booklet on New Steel Plant

An illustrated 12-page booklet has been issued by Joseph T. Ryerson & Son, Inc., 3475 Spring Grove Ave., Cincinnati, Ohio, telling of its improved facilities for supplying steel quickly from stock.

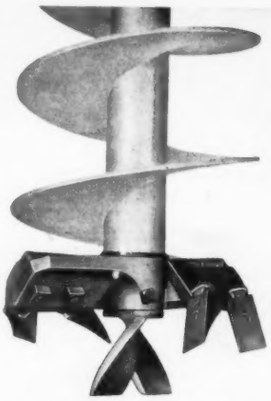
It includes photographs of the company's new plant, personnel, stocks, cutting and shipping facilities, and a brief history of its operations. It lists its principal steel products including carbon-steel bars, structurals, plates, sheets, tubing, alloys, stainless, reinforcing, babbitt and bearings, and machinery and tools.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 311.

Electrode-Selector Chart

An electrode-selector chart has been announced by General Electric Co., Schenectady 5, N. Y. It presents up-to-date condensed information on recommended electrodes for the welding of mild steel, stainless steel, low-hydrogen low-alloy steels, low-alloy high-tensile steels, cast-iron, bronze, and other metals. It is written in tabular form for easy use.

This literature may be obtained from the company by requesting Bulletin GEC-657-B, or by using the Request Card at page 16. Circle No. 345.



This Pengo cutting head can be welded onto any continuous helix-type earth drill or post-hole auger. Eight sizes range from 10 to 24 inches in diameter.

Cutting Head Welds Onto Drill or Auger

A Pengo cutting head for welding onto any continuous helix-type earth drill or post-hole auger is announced by Petersen Engineering Co., 460 Kifer Road, Santa Clara, Calif. It is of twin-helix design and is available in eight sizes ranging from 10 to 24 inches in diameter.

The Pengo cutting head is said to work favorably under any kind of ground conditions and to bore holes under adverse conditions where formerly only heavy-duty machines were used. The cutting teeth are arranged in a staggered pattern. All cutting-head parts are standard and are interchangeable with the standard Pengo earth auger of the same size, including the shank plates, replaceable points, and the fishtail pilot bits.

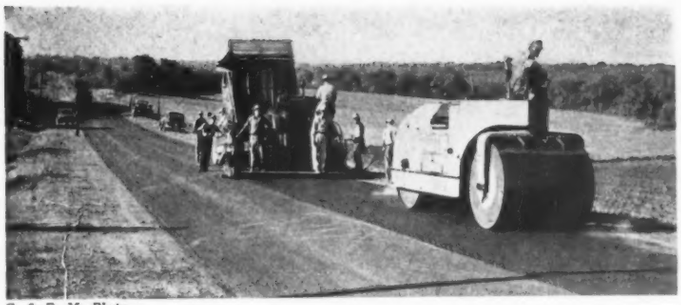
Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 267.

Timken District Manager

Sherman R. Lyle, formerly of the Cleveland office of The Timken Roller Bearing Co., Canton, Ohio, has been appointed District Manager of the company's Steel and Tube Division, Northern Pennsylvania and New York State District, with headquarters in Buffalo. Mr. Lyle, who joined Timken in 1940, has been Sales Engineer for the Cleveland District since 1946.

Hot-Mix Resurface Salvages Pavement

Heavily Traveled Road Between Kansas City and St. Joseph, Mo., Restored by Asphaltic Concrete



C. & E. M. Photo

As flagmen maintain traffic on U. S. 71 in Missouri, Land's Galion tandem roller comes up close to the Barber-Greene layout machine.

• SEVERAL years ago, somebody stood up at the national convention of the American Association of State Highway Officials and said flatly, "A worn-out concrete pavement is like a patient with cancer. To cure it, you've got to operate on the subgrade. Surface treatment is only a sedative."

The great state of Missouri, with the lowest gasoline-tax rate in the country, goes along with that official. In fact, Missouri engineers believe major reconstruction programs would be wonderful, and *are* in states that have the money for them. Missouri doesn't have the money for such expensive operations, so she takes the sedative instead. But it's a sedative that gives more than mere temporary relief.

On U. S. 71 between Kansas City and St. Joseph, Land Construction Co. has administered the sedative to approximately 9 miles of old, worn-out concrete pavement on one of the heavily traveled north-south state routes. The treatment consisted of 3 inches of hot-mix asphaltic-concrete upper-decking, which made the old road much smoother. By filling up the curb lips, it also increased the width to 20 feet: still substandard, say the engineers, but better than 18 feet.

The old pavement was generally about 25 years old. Originally, it was an 18-foot portland-cement-concrete slab, laid down on graded clay characteristic of that section of the state. In 1934, a minor widening job was done, and in 1939 part of the present contract received 1¾ inches of asphaltic-concrete resurfacing. Land Construction Co. standardized all of this past work so the section would be a uniform 20-foot roadway of asphaltic concrete. Three jobs were included in the contract.

Plant Setup a Problem

The hot-plant setup presented something of a problem. For one thing, the only good site was in the town of Faucett along the Chicago Great Western railroad. This made an unbalanced haul of 7 miles to the south end of the project. Moreover, a plant setup along a railroad spur in town made it practically necessary to blend the two large aggregate sizes at the quarry, giving no control over the input to No. 3 and No. 4 bins on the hot plant. It is always costly to heat aggregate in a plant dryer and then have the screen kick off excess quantities of one size. That problem was solved by carefully sampling the quarry output to insure as small an amount of waste as possible.

Land shipped asphaltic cement by trucks, instead of by rail. But Missouri specifications require a state sample of each load, and there wasn't time to take and test that sample in the short 50-mile trip from the Phillips Petroleum Co. refinery at Kansas City. So Land solved that one by putting up two 8,000-gallon asphalt-storage tanks at the plant. Trucks were sampled as they left the refinery, and unloaded to one storage tank when they got to the job. In five hours, if there had been no telephone call from the refinery, the sample had passed inspection and that tank was ready to use. The next batch then went into the tank that was empty.

No sample failed to pass inspection . . . but early in the job there was a sudden increase in the penetration factor, for no apparent reason. When they checked at the refinery, they found that asphaltic cement and diesel fuel were being pumped through a common header line at various times, so it was a simple case of the diesel fuel softening the AC.

Aside from these problems, the plant setup was normal. The asphalt plant was a Barber-Greene 60-ton-per-hour continuous-mix type, standard throughout. It was set up in a flat spot north of the railroad tracks in Faucett, and with the exception of a somewhat congested work space, the site was good.

(Concluded on next page)

Hot-Mix Resurface Salvages Pavement

(*Continued from preceding page*)

A small stream meandering past was dammed to supply boiler feed water to a 110-hp Broderick horizontal boiler, which heated the two 8,000-gallon asphalt tanks and supplied steam to the pugmill and dryer atomizers.

Coarse stone aggregate came from the Kerford Quarries at Amazonia, Mo., by rail. It was crushed limestone. "Buckshot", the local name for ⅜-inch aggregate, was supplied by Kerford and Centropolis Quarries at Kansas City. Sand came from the Pioneer Sand Co. plant on the Missouri River at St. Joseph, and was trucked in. The 70-85-penetration asphaltic cement came from Kansas City by truck.

Aggregate and sand were fed into the plant by a Lorain 1-yard clamshell bucket. For base-course mix, the company used 1½-inch, ⅝-inch, 5/16-inch, and No. 10 screens to separate the 4-bin pull. Inevitably, because of the lack of control on the coarser sizes, there was some waste. But a small International TD-9 with the smallest-size blade Bucyrus-Erie makes could handle this excess in one hour out of the shift.

For the top-course material, the company planned to use the same screens and jiggle the sizes around a ⅜-inch break point. The quarry had a large stockpile of material that size and smaller, and by taking advantage of the liberal size tolerances in the specifications, a mix could be made which would give density and stability and still use available quarry material.

The plant was operated very close to its capacity, and from 7 to 10 batch trucks, hauling 7-ton net loads, carried the material away to the highway.

Preliminary Work Necessary

Preliminary work prior to resurfacing is usually a necessity on a job of this kind, and this was no exception. Last fall and winter, regular maintenance crews of the Missouri Highway Department completed preparatory work. Two years ago, when the pavement started to break up badly, extensive mud-pumping was done. Last winter the voids above the mud slurry were filled with asphalt underseal, without attempting to raise the slab.

At the same time, excess joint-filler material from crack pouring was burned away. Unless this material is removed, hot-mix will melt it, and it will come up through the asphaltic-concrete surface. So this was cleaned off as much as possible.

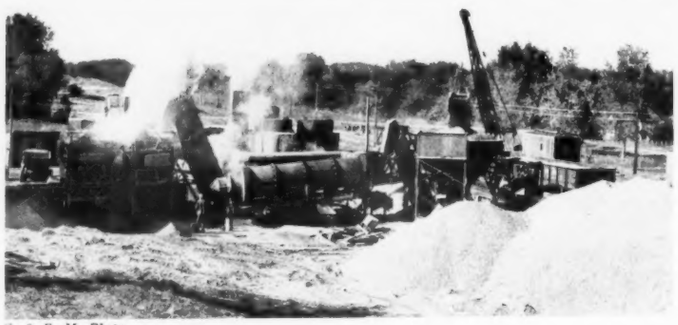
Just before laying the hot-mix, Land Construction Co. applied a tack coat of 0.06 gallon of RC-0 per square yard. The prime was applied over half the highway, leaving the other side dry for traffic. Generally, only enough prime to last about two or three shifts was applied at one time. The RC-0 was supplied by Standard Oil Co. of Indiana from its Kansas City refineries.

A Two-Course Laydown

The 3-inch asphaltic-concrete topping was laid in two courses generally, with an occasional third course over some of the worst places where the subgrade was none too good. The base course was 1¾ inches compacted, while the surface course compacted to 1¼ inches. No seal coat or armor was included in the contract.

The material was laid by conventional methods by a Barber-Greene 10-foot asphalt tamping finisher. The machine traveled one way for one day, and returned the next to complete the course for that run. All the base was laid ahead of topping course to use the hot plant at its fullest efficiency.

The loads were covered by tarps during the haul, and they were dumped directly into the Barber-Greene hopper which fed the asphaltic concrete down to the tamping feet of the machine. There was about 4.7 per cent of asphaltic cement in the mix, and the particles were well coated.



C. & E. M. Photo

A Lorain clam dumps sand to the hoppers of the Barber-Greene asphalt plant Land Construction Co. set up along the railroad in Faucett, Mo.

Two Galion 10-ton tandem rollers were used for compaction. The first pass was made close behind the laydown machine, on anything but very hot days, and the finish rolling was done shortly afterward. Density tests slightly exceeded the design, and one of the engineers' problems was to maintain the required percentage of voids in the compacted mix. That was about 5 per cent.

There is every indication that the resurfacing treatment will restore the highway to its original smoothness, and retain it in that shape for a period of from 5 to 15 years more. Research engineers are beginning to agree everywhere that inherent bearing values exist in old roadbeds, despite the bad surface condition, and the resurfacing sedative with high-type asphaltic concrete is expected to take advantage of this intangible value.

Personnel

Field operations for Land Construction Co. were under the supervision of Fred E. Dawkins, General Manager and William E. Herzog, Superintendent.

C. F. Brumbach, Project Engineer, headed up the field forces for the Missouri State Highway Department. The project was designed and supervised under the direction of C. W. Brown, then Chief Engineer, with J. J. Corbett as Engineer of Construction and L. M. Hoskins, Division Engineer.

Capacity of this Samson No. 4 slitting shear is ⅛-inch mild-steel sheet or plate; its net weight is 40 pounds.

New Slitting Shear

A hand-lever slitting shear has been developed by Julius Blum & Co., Inc., 532 W. 22nd St., New York 11, N. Y. The Samson No. 40 has a blade length of 14 inches which makes it suitable for cutting wide strips of light-gage metal in one stroke of the lever, the company says. The offset frame is said to permit slitting sheets of any length or width.

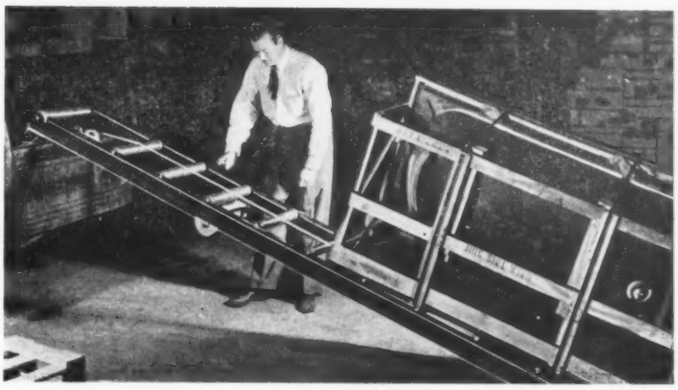
The capacity of the shear is ⅛-inch mild-steel sheet or plate; the net weight is 140 pounds. The frame is of steel-plate construction and is unbreakable. The Model 40-S has straight blades and the 40-C has special blades for shearing corrugated sheets up to No. 16 gage.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 307.

Cites Vacuum-Concrete Uses

A large booklet picturing the uses of vacuum concrete in various countries of the world has been prepared by Vacuum Concrete, Inc., 4210 Sansom St., Philadelphia 4, Pa. Excellent photographs show phases of construction and the features of vacuum lifters in this type of work.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 291.



The Belsaw Machinery Co.'s one-man loader comes in 10 and 20-foot lengths, weighs 150 pounds, and handles a load up to ½ ton.

New One-Man Loader

A portable loader said to make a one-man job of loads that normally require two to four men has been introduced by Belsaw Machinery Co., 315 Westport Road, Kansas City 2, Mo. It is available in 10 and 20-foot lengths, weighs under 150 pounds, and handles up to ½-ton loads, the company says. It has an easy-to-operate 2-speed hand winch. An extension handle permits loading wide boxes and crates. The company points out that the unit is especially useful for builders in loading heavy bulky items to and from the job.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 308.

Heavy-Duty Primer

A heavy-duty metal primer that can be used with both active-solvent protective coatings and conventional paints has been developed by Prufcoat Laboratories, Inc., 50 E. 42nd St., New York 17, N. Y. It may be applied to ferrous or nonferrous metals.

Primer P-50 requires only overnight drying prior to the application of active-solvent finish coats, the company says. It is composed of a heavy-bodied oil-modified synthetic resin vehicle, carrying a high percentage of inhibitive pigments, principally zinc chromate. It deposits a relatively heavy primer film which is said to level out rough surfaces and provide protection at sharp edges, rivets, projections, and other vulnerable points. Coverage on smooth metal averages 400 square feet per gallon.

The primer may be used wherever conventional metal primers are ordinarily used. No extra steps or special operations are needed. It is suited for spot-priming old work, or it may be used as a complete over-all prime coat on surfaces having old but not completely removed paints or coatings, Prufcoat claims.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 384.

U. S.-Made British Diesels

Twin Coach Co., Kent, Ohio, has acquired exclusive American manufacturing and sales rights to diesel engines produced by Leyland Motors, Ltd., of England, largest British manufacturer of diesels. Fageol Products Co., a Twin Coach subsidiary, will handle engineering of a full line of engine models with power ranges from 90 to 200 hp. The engines will be sold in this country under the name of Fageol-Leyland and will be completely "Americanized" with SAE standard threads incorporated into engines, accessories, and fittings.

Both the United States company and its Canadian subsidiary, Twin Coach of Canada, Ltd., will use the engines in their busses and trucks, and will offer a complete line of Fageol-Leyland industrial power units suitable for power shovels, tractors, etc.

Initial Fageol-Leyland deliveries will be made during the first quarter of this year.

New Dock Is Built At Ocean Terminal

Unique Rig Drives Timber-Pile Anchorage for the 1,200-Foot Steel-Sheet-Pile Bulkhead for Morehead City, N. C., Dock

There were three key rigs in Loving's contract to build a new dock west of the existing pier at Morehead City, N. C. The steel-sheet-pile bulkhead was driven by a McKiernan-Terry 9B3 hammer from this stiffleg derrick mounted on two wooden barges lashed and bolted together. Here workers connect the two legs of the derrick, one supported by a Northwest crane, to the top of a 60-foot mast. When that is done, the 100-foot boom will be erected.

Timber piles to which the steel bulkhead was anchored were driven from this contractor-built rig. It consisted of double A-frames on a base that traveled over 25-foot-gage rails. Leads 55 feet long moved on a roller running along the top cross beam. A McKiernan-Terry 9B2 hammer drove the piles, two to a row, those in alternate rows battered in opposite directions for compression and tension.

C. & E. M. Photos

By WILLIAM H. QUIRK,
Eastern Editor

(*Photo on page 1*)

• THE North Carolina State Ports Authority is enlarging the ocean terminal facilities at Morehead City in Carteret County under a $1,898,539 construction contract to T. A. Loving & Co. of Goldsboro, N. C. The existing 1,600-foot pier at the port terminal, completed in 1935 with RFC financing, runs roughly north and south along the west bank of the Newport River. T. A. Loving & Co. also had the contract for this initial facility.

Under this present contract, a new 1,200-foot dock is being built west along the waters of Bogue Sound, from the south end of the existing pier. The work got under way in September, 1950, and is scheduled for completion early this year. Atlantic Beach, a 30-mile-long barrier reef with Bogue Inlet at the west end and Beaufort Inlet at the east end, shelters the Morehead City ocean terminal from the Atlantic. The channel in Bogue Sound will be dredged to a 35-foot depth to accommodate ocean-going as well as coastwise shipping. Along the dock the depth of water will be at least 30 feet.

U. S. 70 and the tracks of the Atlantic & East Carolina Railroad are along the north side of the terminal site. A few industries are located at this upper end, and a transit shed lies just back of the existing bulkhead along the east side. Ground elevation at the upper end of the site and along the east dock averages plus 10. For the southerly couple of hundred feet at the lower end, where the new dock is being built, the ground fell away to 0.0 or even minus elevations. This low area was brought up to grade before work got under way on the dock itself.

Surcharge for Stabilization

Borings at the site had indicated an area of soft silt deposits in the substrata behind the new dock, about halfway of its length. It was decided to stabilize this piece of ground, approximately 800 feet long x 300 feet wide, by building up a dome-shaped surcharge over it, having a maximum elevation of plus 16 at the center where the softest subsoil was located. The slopes of the dome would run out to where firm ground was encountered.

Grading was done with six tractor-scraper units—International TD-18 tractors with 10-yard Bucyrus-Erie and Heil scrapers, and LeTourneau Carryalls. Excavation totaled 177,000 cubic yards, with another 77,000 yards required for the surcharge. Material was mostly fine white sand that had been hydraulically dredged in recent years from Bogue Sound, to form a channel for the Inland Waterway, and had been deposited on the shore. Some dunes farther back also yielded material for filling in the low end of the site.

In addition, about 50,000 yards of sand for the surcharge was obtained from a borrow pit on the site by excavating down to 5 elevation from the natural grade of 10. Except for the higher elevation in the surcharged area, the site was graded to 10 elevation. The surcharge pile was completed by October 15, 1950, but driving of the sheet piling for the bulkhead was not started until February 15, 1951. By that time the surcharged area had subsided 14 inches at a uniform rate of settlement and without any lateral movement, indicating that the full consolidation had been obtained.

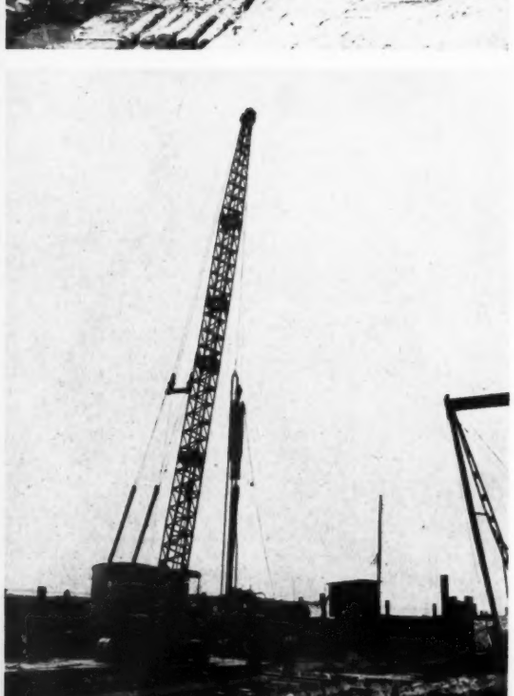
As the structure was completed, the surcharge was removed for use as backfill against the bulkhead and to fill in the borrow-pit hole. Additional material required for this purpose was obtained by dredging in the ship channel. The dredging was estimated at 188,000 yards, but much of this had to be wasted as unsuitable material, since it was bottom silt that had to be removed in order to reach the desirable sand farther down.

Sheet-Pile Bulkhead

The dock consists of a steel-sheet-pile bulkhead tied down to a line of anchorage piles 54 feet back from the face of the bulkhead. Both the steel-sheeting and the timber-pile-anchorage systems are topped with reinforced-

(*Continued on next page*)

As for the timber platform behind the bulkhead to reduce its lateral pressure on the anchorage system—this Manitowoc Speedcrane at left, with an 80-foot boom, handled the McK-T 9B2 hammer which drove the timber-pile bents. Below, left to right, you can see the fender system of the new dock, the steel bulkhead, the relieving platform with the Speedcrane at work, and the battered-pile anchorage system with the A-frame rig in position.



C. & E. M. Photos

As the batter piles for the anchorage were driven, they were cut off to grade by a Mall gas-driven chain saw. Then both steel-sheet and timber anchor piles were capped with reinforced concrete. The Rex 27-E paver at right mixed the concrete batches, which were delivered from the nearby plant by truck.

concrete caps. Immediately in back of the concrete cap on the steel sheeting is a timber relieving platform, 32 feet wide, that runs the full length of the bulkhead. Its top is at elevation 1.5, or 8½ feet below the finished grade at the site, and is covered over with the sand backfill. The purpose of the platform is to reduce the lateral pressure at the rear of the bulkhead.

U. S. Steel MZ-32 sections, 21 inches wic x 11½ inches deep, were driven for the bulkhead. They are 64 feet long and weigh 56 pounds per linear foot of pile. The sheeting was shipped by rail from the Homestead, Pa., mill directly to the site, which has a siding of the Atlantic & East Carolina Railroad running along its eastern border. Steel sheeting for the job totaled 1,348 tons.

In order to limit the size of cofferdam in use at one time, the bulkhead was built from the east end to the west end in sections averaging 300 to 350 feet long. Short stretches of temporary steel sheeting, 30 feet long, were driven 10 feet in front of the new bulkhead to serve as a cofferdam. In the beginning a land rig was used for driving the steel sheet piling, but before long it was replaced with a floating driver that was considered more suitable for the work in hand. Two wooden barges, 30 x 110 feet, were lashed and bolted together. Across their deck a stiffleg derrick was erected, having a 60-foot mast and a 100-foot boom. Piles were set with a combination of jetting and driving, using two Jaeger 3-inch jet pumps and a McKiernan-Terry 9B3 hammer. Compressed air for job needs was supplied by 3 Gardner-Denver compressors—one 500-cfm and two 350-cfm. They were connected in series, with the air distributed to where it was needed through a 3-inch pipeline. All piles were driven by air.

Unique Driving Rig

The anchorage system to which the steel bulkhead is tied consists of a line of untreated-timber piles, two piles to a row, with the piles in alternate rows battered in opposite directions for compression and tension. Piles are eastern North Carolina pine with 8-inch tips and 13-inch butts; compression piles average 40 feet long, tension piles, 50 feet. They were spaced as close as they could be if they were to be driven on the 3:1 batter, or 4 inches to the foot; spacing averages 15 inches.

These timber battered piles were driven by a special rig, built by the contractor for this particular job. It consisted of double A-frames set up at the ends of a base frame; the frame was equipped with wheels that moved over rails having a 25-foot gage. The wheelbase of the rig was 20 feet, and the beam connecting the tops of the A-frame was 40 feet above the work-

(Continued on next page)

New Dock Is Built At Ocean Terminal

(Continued from preceding page)

ing platform. Leads were 55 feet long, and swung from one side of the rig to the other in driving piles with opposing batters. At the base the leads had a lateral movement of 4 feet which was increased to 30 feet on the top cross beam. The leads moved on a roller that ran along the cross beam.

A Lidgerwood 3-drum hoist, powered by air, moved and operated the driving rig which was built entirely of steel. It advanced on steel rails 40 feet long which were supported on timber cribbing. Driving was done with a McKiernan-Terry 9B2 hammer at the rate of 35 batter piles in an 8-hour shift. A Mall gas-driven chain saw cut piles off to grade so that compression piles would extend a minimum of one foot, and tension piles 3 feet, into the concrete cap that goes over the line of anchor piles.

Concrete Caps

As sections of piling—both steel-sheet and timber-anchor—were driven, they were capped with blocks of reinforced concrete. At the bulkhead the cap is 3 feet wide x 12 feet deep, with its top at plus 10 elevation and the bottom at minus 2. It encases the upper 10 feet of the steel sheeting, which was driven to elevation plus 8; thus it protects the metal from corrosion or electrolysis. At the anchorage piles the concrete cap is 8 feet wide x 4 feet deep, with the bottom at elevation minus 1.3.

The steel bulkhead is tied back to the anchorage system with 2⅛-inch tie rods on 5-foot 3-inch centers. They are embedded in the concrete anchorage 2½ feet above the bottom, and at elevation minus 0.5 in the bulkhead. A fender system, bolted to the front of the bulkhead cap, consists of greenheart timber imported from British Guiana. It has a thickness of 12 inches, with an 8-inch strip next to the cap, to which is bolted an outer 4-inch strip. As the thinner outer strip is reduced by wear, it can easily be replaced by slipping off the lag screws that hold it to the inside timber.

For the concrete work a batch plant was set up along the railroad siding serving the site. Sand and stone aggregate were stored in a Blaw-Knox bin, while Lone Star bulk cement from Norfolk, Va., was kept in a Heltzel 400-barrel bin. Another 350-barrel silo was added later. The Bryan Rock & Sand Co. of Goldsboro, N. C., furnished the aggregate. Reinforcing steel came from Hall-Hodges Co. of Norfolk, Va. Three trucks, holding two batches each, picked up materials by driving under both bins and then delivered them to a Rex 27-E paver for mixing. Water for the concrete was available right at the terminal site.

The Mix

A typical 6-bag batch of concrete with 3,000-pound strength at 28 days had the following weights of ingredients:

Cement	564 lbs.
Sand	1,200 lbs.
Stone	1,825 lbs.
Water—34 gals.	282 lbs.
Total	3,871 lbs.

To each batch 3.2 ounces of Ayr-Trap air-entraining agent was added from a dispenser on top of the paver.

Forms were built with either ¾-inch dressed lumber or ⅝-inch plywood, backed with 2 x 6 studs on 16-inch centers and double 2 x 6 wales spaced according to the loading. Richmond form ties held the panels together. Wherever possible, concrete was placed with the paver bucket running out on the boom to the forms. Beyond this reach, the concrete was handled by crane and bucket, or by 3 Scoot-Cretes, power buggies holding about ¼ yard of concrete. Jackson vibrators were used to vibrate the concrete as it was placed. Curing was done with Horncure.

Concreting was done in sections corresponding to the stretches of the cofferdam. Higher sand at the rear acted as a barrier, thus enclosing the work area which was kept unwatered with a variety of pumps including Rex, Marlow, and Jaeger up to 10 inches in size. As the outer cap was poured, the temporary sheeting for the cofferdam was moved ahead to permit more pile driving in the bulkhead. The floating pile-driver rig was towed around by the Last Chance, a landing craft converted into a work boat.

Relieving Platform

While the bulkhead and anchorage construction was under way, the relieving platform was being built behind the bulkhead. It consists of untreated-timber pile bents at right angles to the bulkhead on 5-foot 3-inch centers; the tie rods from the bulkhead wall to the anchorage system go between the bents. Each bent contains 7 piles, 8-inch tips and 13-inch butts, ranging in length from 42 feet near the bulkhead cap to 32 feet at the land side. (Due to soil conditions for about 400 feet, extra-length piles up to 52 feet long were required.) In the bents the piles are spaced 4 feet 8 inches on centers, and have a capacity of 20 tons.

Piles were driven with a McKiernan-Terry 9B2 hammer handled by a Manitowoc Speedcrane equipped with an 80-foot boom. The rig built its own work platform over the piles as it moved ahead with the driving. Pile cutoff grade was 0.0 for the 12 x 12 caps, 32 feet long. A 6-inch timber decking was laid across the caps; over this went the sand backfill, which was placed wet and vibrated with Jackson concrete vibrators to obtain compaction. Riprap will also be placed over the sand from the bulkhead to shore lines at the western end of the project.

A 485 x 125-foot transit shed is being built under this contract, with its long side parallel to the dock and 31 feet 6 inches back from the face of the bulkhead. Two tracks will be laid between the dock edge and transit shed. Behind the transit shed, an area will be paved for storage; it will have the same dimensions as the shed. Farther back, 200 feet from the bulkhead, two storage sheds will be erected in which commodities passing through the port

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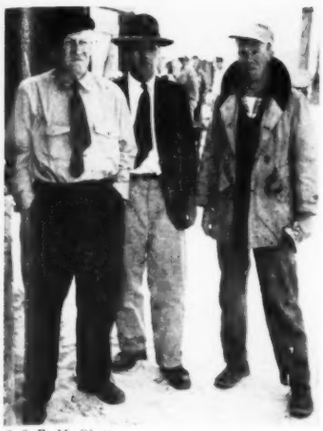


C. & E. M. Photo

Left to right: A. M. Ferebee, Resident Engineer for consultant Carr & J. E. Greiner Co., and William A. Townes, Engineer, and G. B. Trimble, Superintendent for contractor T. A. Loving & Co., on the North Carolina dock project.

may be kept. These sheds will each be 108 feet wide, with lengths of 323 and 485 feet, and enough space will be available for the construction of two additional storage sheds, if necessary. Each shed will be served by a spur track off the siding, and by concrete roads.

During the early phases of the work, the contractor laid steel aircraft landing mats over the sand to give traction to his trucks in the soft going. The sharp ends cut up the tires, however, so clay and marl were brought in and mixed with the sand to form stabilized haul roads.

In addition to the equipment already mentioned, four Northwest 25 cranes were on the job for excavation, material handling, batch-plant, and concrete work.

Quantities and Personnel

Major items in the dock contract include the following:

Steel sheet piling	2,696,000 lbs.
Structural steel	262,000 lbs.
Untreated-timber piling	141,500 lin. ft.
Concrete	3,520 cu. yds.
Reinforcing steel	180,000 lbs.
Untreated timber	315 mbm
Reinforced-concrete pavement	31,000 sq. yds.
Excavation	177,000 cu. yds.
Dredging	188,000 cu. yds.

T. A. Loving & Co. employed an average force of 50 on the dock project. Key personnel included John S. Loving, Vice President and Project Manager; G. B. "Red" Trimble, Superintendent; and W. A. Townes, Engineer.

Carr & J. E. Greiner Co., Architects and Engineers, of Durham, N. C., and Baltimore, Md., consultants on the project, were represented by A. M. Ferebee, Resident Engineer, assisted by R. B. Peel and D. E. Buck.

Lincoln Welding Awards

The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, announces that the rules and conditions for its Fifth Annual Engineering Undergraduate Award and Scholarship Program are now available. A 24-page booklet covers all the rules of the contest—the closing date for which is May 31, 1952—and shows pictures of the design and research projects described in award papers of previous competitions. Brief descriptions of last year's award papers and a bibliography of welding texts and references are included.

The purpose of the annual competition is to encourage undergraduate engineers to use imagination and ingenuity in developing an engineering project in their own field. All registered undergraduate engineers are eligible to compete, and awards, which total $6,750, are made for the best papers on design of machines or structures, or separate components of machines or structures, in which arc welding is the method of fabrication. Welding research and maintenance projects can also be described. The 63 awards range from $1,000 to $25. Scholarship funds totaling $1,750 are also awarded to schools for the establishment of scholarships in honor of the main student awards.

To obtain the book of rules write to The James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio.

New Excavator Catalog

A catalog describing the latest advances in the Model 304 excavator and its attachments is offered by Koehring Co., 3026 Concordia Ave., Milwaukee 16, Wis. It contains illustrations and drawings of the design, construction, capacity, and application of the unit.

The Model 304 combines a ¾-yard dipper with a 25-ton crane lifting capacity on truck or cruiser mounting and 13.9-ton capacity on crawlers. The machine can be equipped with shovel, hoe, crane, dragline, and clamshell, either on crawler or rubber-tire mounting. Features outlined in the bulletin include self-cleaning crawler shoes, skeleton-type tapered drum lagging, automatic boom hoist brake, mechanical booster clutch, continuous chain crowd, full-rotating fairlead, and power boom-lowering device. Detailed line diagrams illustrate the direct flow of power in the Model 304 through the three-shaft upper machinery arrangement to the vertical shafting of the excavator. Choice of a gasoline, diesel, or electric power unit is optional.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 383.

Road-Paving Equipment

A folder describing a complete line of road-paving equipment has been prepared by the All Purpose Spreader Co., P. O. Box 111, Elyria, Ohio. It illustrates Apsco wideners, base pavers, bituminous finishers, widening chippers, and tandem rollers. Descriptions and specifications of the various models accompany the job illustrations.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 287.

New Ten-Yard Shovel For Peak Production

A 10-cubic-yard mining and quarry-type excavator applicable also for very large construction jobs, is announced by Marion Power Shovel Co., 617 W. Center St., Marion, Ohio. One of the earliest uses of the Marion 191-M will be as a working companion for new truck haulage units in the 50-ton class. It has a capacity to load them in 3 or 4 passes, and enables digging and loading big yardages under adverse digging conditions.

The Marion 191-M is basically a full-electric machine with Ward-Leonard controls. It is equipped with Amplidyne or Rototrol high-speed electrical controls. High-voltage line current is converted into direct current for powering the operating motors. Separate motors and generators operate the hoist, crowd, and swing motions, and there is an exciter for each generator combination to make the motors immediately responsive to the operator's controls. For use in areas where electric power is not available, the 191-M will be furnished as an all-diesel-electric machine, with the diesel engines driving the dc generators.

Marion's new 10-cubic-yard machine, the 191-M, is teamed here with one of the largest truck units developed to date, a 50-ton Euclid rear dump, which it loads in four passes. Production potential of the 191-M is said to be over 600,000 yards a month.

The lower frame is formed of heavy steel plate welded into a deep bulkhead structure for strength and rigidity. The crawler side frames are attached to the frame structure by bolts and heavy key-type doweled joints. The propel mechanism is fully enclosed and is hydraulically controlled to eliminate electrical assemblies in the lower frame. Crawler shoes are of manganese steel, and the crawler belts are driven by "dirt-shedding" sprockets. The dual propel brakes are operated hydraulically and controlled electrically.

The upper frame is a deep, welded structure with machinery supports welded integrally with the frame. Two matching 187½-hp 600-line motors, with blowers, operate the hoist machinery. They also drive the propel mechanism through the use of clutches. The twin swing motors (62½-hp) are also equipped with blowers. Another 62½-hp motor mounted on the boom provides power for crowding and crowd retract. Air-operated electrically controlled ram cylinders are used on the upper frame and crowd machinery.

The house is of unit construction. It has 3/16-inch plates on the side, roof, and front; 3/8-inch plate at the rear; and safety glass for all windows. The gantry is of all-welded steel construction and the boom is all-welded alloy-steel construction. Double brace rods on each side of the boom limit the roll of the boom and provide added safety. The operator's controls are placed so that he faces toward the dipper. The 191-M has a working weight of approximately 710,000 pounds. Marion reports that its production potential is over 600,000 yards per month.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 341.

Weatherproofing Coating

A 4-page booklet on a new weatherproof mineral-armored asphalt for bituminous and metal surfaces has been issued by American Bitumuls & Asphalt Co., 200 Bush St., San Francisco, 4, Calif. It lists many uses of Laykold Fibrecoat and gives detailed application data. It includes specifications, approximate costs, on-the-job illustrations, and information on the equipment used to apply the product. Fibrecoat is available in black, red, and green.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 378.

Manages U. S. Rubber Sales

H. Barden Allison is District Sales Manager of the Philadelphia branch of United States Rubber Co., New York, N. Y. Mr. Allison, formerly Sales Manager of the company's L. H. Gilmer Division, succeeds A. B. Means, who continues as Sales Adviser. Mr. Allison has been with U. S. Rubber since 1918 and has held important selling posts in several of the company's divisions.

Although light in weight, the new Disston DA-211 is a saw that does an extra-duty job. Powered by a 9-hp Mercury engine, the saw can be handled by one man in many cases, although designed primarily as a two-man saw. The man above controls speed by the throttle bar between the handles.

Two-Man Chain Saw

A lightweight two-man chain saw has been placed on the market by Henry Disston & Sons, Inc., Philadelphia 35, Pa. The DA-211 Intermediate features a slotted guiderail in lengths from 2 to 7 feet and a one-piece Spee-D-Tach tail-stock or "stinger" which can be attached in a few seconds, the company says.

For easy carrying, the saw can be separated into two sections, weighing less than 35 pounds each, by removing the cam coupler joining the transmission-rail assembly to the power head. The 9-hp 2-cylinder Mercury engine is shock-mounted to reduce vibration and eliminate fatigue. The bicycle-type handles are shock-mounted in rubber.

The DA-211 has an automatic clutch, automatic chain oiler, nonclogging air intake, and an oversized cooling fan. The controls consist of a positive on-off switch, a throttle control which can be operated with either hand, and a choke. The saw is available with either the Disston chisel-type or leader cutting chain.

Disston points out that the power head incorporates an engine with roller and needle bearings throughout, twin exhaust stacks which minimize back-pressure and provide muffling, reed valves which eliminate back-firing and the need for frequent timing adjustments, and an oversize straight-fin fan for maximum cooling. The DA-211 has a ribbon-type air filter with a forward intake baffle to prevent clogging by chips or sawdust, a self-rewinding starting cable, and a float-type carburetor. A piston-type pump with positive pressure regulated by a needle valve feeds oil directly into the rail slot and is said to permit smooth chain action in any cutting position. The saw will mount a holding claw suited to the timber to be cut.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 312.

U. S. Plywood Expands

The opening of a new warehouse for plywood in St. Paul, Minn., is announced by U. S. Plywood Corp., New York, N. Y. The building, located at 764 Vandalia St., replaces a smaller warehouse which the company has been using in this area for the past two years.

B. W. Thayer is Manager of the new warehouse, which contains 20,000 square feet of storage space as well as sales, showroom, shipping, and administrative facilities.

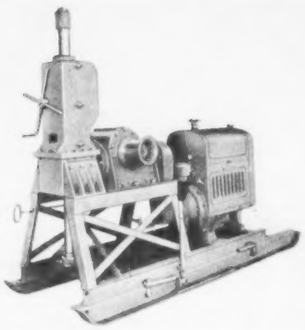
U. S. Plywood announces further that it has taken over the management of the Panama Forest Products Corp., located in Panama City, Panama, and that it has an option extending for a period of years for the purchase of a 50 per cent interest in the Panama company. U. S. Plywood intends to develop the Panama timber (which is considered equal to the best wood available anywhere in the tropics) as a source of supply for raw materials required by some of its domestic plants. The Panama company plant is already in operation, and a 35,000-square-foot addition is now being built. Willis E. Parnell is Manager of the new plant.

Robert L. Bonaparte has been appointed Sales Manager of U. S. Plywood's New York City distribution unit at Southern Blvd. and E. 144th St., New York 54, N. Y. Mr. Bonaparte joined the firm in 1948 and has served in various district branches.

M-C&S Has Texas Office

Merritt-Chapman & Scott Corp., construction firm of New York, N. Y., has established an office at Dallas, Texas, to serve as headquarters for the company's activities in the southwest and Gulf Coast areas. J. B. Allinson, M-C&S regional representative in the southwest, heads the new office, which is located at 704 Kirby Bldg., Dallas. Mr. Allinson comes to the firm with ten years' experience of all types of construction operations, most of them in the southwest.

Other M-C&S branch offices are at Cleveland, Ohio; New London, Conn.; and Boston, Mass.



The Acker Model KR shot core drill recovers cores from any formation, up to 20 inches in diameter and to depths of 600 feet.

New Shot Core Drill

A shot core drill for subsurface exploration is announced by Acker Drill Co., Scranton 3, Pa. The Model KR is designed to recover cores from any formation, hard or soft, up to 20 inches in diameter and to depths of 600 feet. The entire unit can be mounted on drag skid, trailer, or truck. Power can be supplied from the takeoff of a Jeep or truck, from a gasoline or kerosene or diesel engine, or from an air or electric motor. A 15 or 25-foot derrick can be supplied with the unit.

The KR consists of a heavy-duty rotary drill head with a 3-speed transmission, a cargo-type hoist, and a gear-driven positive-displacement pump. An effective feed system carries the shot down the interior of the drill rods directly to the cutting bit. Drill cuttings are flushed to the surface. Operation is economical, the company claims, particularly in cores 3 inches and over, because shot bits are run to destruction and bit maintenance is held to a minimum. Operation is also simple and requires no special skill or experience.

The KR drills tube and artesian wells in hard formations. It also recovers test cores from highways, airfields, or large masonry or concrete structures. Steel reinforcement bars offer no obstacle to it, and large test cylinders are quickly and easily recovered from concrete having such reinforcement, Acker says.

Further information may be obtained from the company by requesting Bulletin 19. Or use the Request Card at page 16. Circle No. 254.

Copies Drawings and Charts

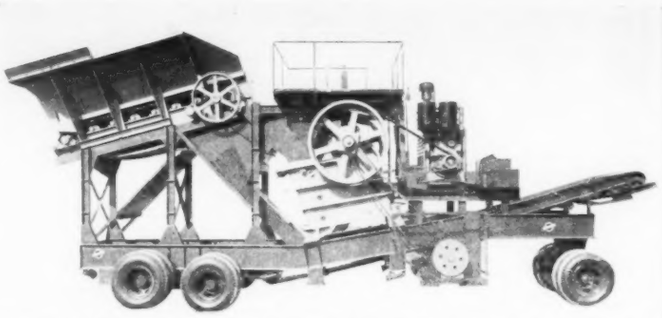
A 4-page folder describing the Model 20 Copyflex for reproducing drawings and charts has been prepared by Charles Bruning Co., Inc., 100 Reade St., New York 13, N. Y. It points out that the 46-inch printing width allows ample leeway for customary 42-inch roll stock or for multiple cut sheets inserted side by side. Though usual procedures call for black-on-white copy, the machine can produce prints made in 20 color combinations.

According to the manufacturer, the Copyflex can copy practically anything that is drawn, written, typed, or printed on translucent paper. Easy to operate, and free from fumes and fuss, it provides exact replicas at a cost of approximately 2 cents per square foot, Bruning says.

This literature may be obtained from the company by requesting Booklet A-2009, or by using the Request Card at page 16. Circle No. 323.

Three New Primary Portable Crushers

A new line of portable primary crushers in three sizes has been announced by Smith Engineering Works, 532 E. Capital, Milwaukee 12, Wis. The new Telsmiths consist of a heavy-steel receiving hopper with a special-duty apron-type feeder, a heavy-duty roller-bearing all-steel jaw crusher with cast-steel frame and swinging jaw, a steel operator's platform with controls, a delivery conveyor and power unit with V-belt drive, all mounted on a sturdy steel chassis. A front axle with a towing pole or king pin for tractor-truck hauling can be furnished.



Three new Telsmith portable primary crushers are on the market in 15 x 38, 18 x 32, and 25 x 36 sizes. A grizzly between the feeder and crusher is optional.

The Telsmith plant is available with or without a grizzly between the feeder and crusher, and is suitable for operation in either quarries or gravel pits, according to the manufacturer. The available sizes are 15 x 38, 18 x 32, and 25 x 36.

Further information may be secured from the company by requesting Bulletin No. 277. Or use the Request Card at page 16. Circle No. 313.

Dual-Lane Widening Starts on U. S. 66

Dangerous Tijeras Canyon Near Albuquerque Is Modernized With Two 24-Foot Traffic Lanes and 70-MPH Alignment

• THE biggest road job ever let by the New Mexico Highway Commission is under way in tortuous, twisting Tijeras Canyon, on U. S. 66, about 10 miles east of Albuquerque. Skousen-Hise Contracting Co. of Albuquerque was the successful bidder on the $1,600,000 contract, which includes grading, drainage, structures, granular ballast course, and hot-mix paving.

The "Main Street of America" improvement, which should reduce the number of automobile accidents through the 7.95-mile danger section, is an example of how the New Mexico Highway Commission is moving rapidly toward high-type pavement, modern alignment, better drainage, and stronger subbase design.

The old highway, a twisting, winding, worn-out relic of 1934, is but 20 feet wide. Skousen-Hise's new work will move the entire highway to a permanent new 70-mile-an-hour alignment and create a dual highway with two 24-foot traffic lanes to separate the traffic. The median strip varies from a few feet to over 250 feet.

Except for the superelevated curves, the pavement will have a 2 per cent crown slope. It will be 24 feet wide, and there will be 8-foot shoulders. There will be a wearing surface of 2 inches of hot-plant asphaltic concrete, and directly under that an asphalt-processed base (they run it through a hot plant, too) 31 feet wide. Over most of the new work the granular ballast varies from 3 to 6 inches, the width across the top of ballast is 38 feet, and the top of earthwork is 41 feet across for each lane.

The project passes through a mountainous canyon area where solid granite, disintegrated granite, and practically every igneous rock in between must be removed. There are 42 drainage structures, one of which is a double 10 x 12, 120 feet long, and innumerable concrete pipe culverts. Grading started in January, 1951. Skousen-Hise has 450 working days to finish the entire project, and Superintendent Andy Isbell has set up operations on a 5-day working basis per week.

Traffic Detoured

Traffic is being handled at present by three detours, graded around the work. These detours are bituminous-surfaced, and flagmen are stationed at all strategic points where equipment has to cross the highway. The old road will also serve to carry traffic at various points.

U. S. 66 is one of New Mexico's most traveled roads, carrying heavy transcontinental traffic. Large trucks, passenger automobiles, and tourist caravans are a usual sight. Thus the handling of traffic is one of the most important problems.

Grading Is Heavy

Grading was set up around an unclassified item of 952,760 cubic yards, which Skousen-Hise bid for 68 cents per cubic yard—5 cents under the next-lowest bidder. While there was much conglomerate, decomposed gravel, and other material which could be dug direct or excavated after ripping, a considerable portion was hard granite. At the west end of the project, near the canyon entrance, the rock was unusually hard.

Other grading items included 8,220 cubic yards of structure excavation, 6,050 cubic yards of excavation for pipe culverts, 35,130 cubic yards of borrow material, and 2,233,800 station yards of overhaul.

Drilling and blasting was generally a jackhammer operation in shallow

(*Continued on next page*)

C. & E. M. Photo

There was plenty of rock excavation on the Tijeras Canyon job in New Mexico. A Koehring Dumptor places a load of broken rock in a fill.

Dual-Lane Widening Starts on U. S. 66

(*Continued from preceding page*)

cuts, with 7 machines working, and a wagon-drill operation in the deeper cuts. Isbell had two Ingersoll-Rand wagon drills and four 315-cfm compressors, of which two were Worthingtons, one was an Ingersoll-Rand, and one was a Schramm. There was also a smaller 105-cfm machine.

Drill steel was generally 18 to 20 feet long, and there were tungsten-carbide Timken bits, and also some Liddicoat throwaway bits on the project. The holes were sunk on various centers, ranging from 6 to 18 feet in the highly variable material. Almost always the holes were sprung with about 8 sticks of gelatin, and then loaded to a point near the top with Du Pont 40 per cent bag powder. Regular instantaneous blasting caps and a blasting machine were used to set off the shots. Traffic was stopped for at least 1,000 yards on either side when a shot was fired.

For short-haul excavation in easy material, two LeTourneau 23-yard Carryalls were used with D8's fore and aft. There was also a D8 with a Wooldridge ripper to loosen material ahead of this team, and three D8's with dozers and a Caterpillar No. 12 motor grader to help spread the material.

For longer haul work, and excavation in rock especially, the company selected a hauling fleet of 7 Koehring Dumptors, 2 Euclid end-dumps, and a Tournarocker. Loading equipment included two Northwest 1¾-yard shovels, a Northwest 1½-yard machine, and a ¾-yard Northwest shovel.

Auxiliary equipment for processing the embankments included 5 water-tank trucks, four sets of sheepsfoot rollers, and the necessary tractors to operate them. One of the big auxiliary jobs connected with grading was the replacement of backfill around concrete culverts. A fairly large crew of men was busy on this one operation. Water had to be hauled for about 5 miles to moisten the earth, which dozers shoved up to the crews. Men then spread the dirt by hand, and compacted it with Gunderson-Taylor assemblies of pneumatic tamping machines.

As a general rule, the cuts and fills were fairly well balanced, although there was some borrow. The project was worked, therefore, in several spreads. The deeper cuts were made by drilling equipment and shovels, where rock was found, and the material was then hauled to the nearest fill point and processed to about 95 per cent of modified AASHO density. In between, scraper equipment stripped and took down the shallower cuts which it could handle.

Equipment Care

A central equipment shop was set up about halfway through the project, to keep machines in good running order. The company also uses small, demountable shacks to make up its construction headquarters camp. At Tijeras Canyon, it has a main equipment shop, parts house, tool house, oil house, an office, storehouse, and a carpenter-shop headquarters.

Most of the routine service is delivered by the usual mobile service equipment. The one on this project is mounted on a Chevrolet truck. It carries 500 gallons of diesel fuel, a Wisconsin-driven compressor and a Graco Convoy Luber, 3 drums of motor oil, and one drum of gasoline. If spot repairs are necessary, they are usually made in the field. More extensive repairs are made at the yard.

Culvert Construction

Much of the early work centered around the installation of concrete pipe and larger reinforced-concrete culverts. The concrete pipe drains were handled by a Wagnermobile, which brought them up to where they were placed. Sometimes, in places inaccessible to the Wagnermobile, a small Michigan crane swung them into place.

Forms for the many reinforced-concrete culverts were made up in the headquarters carpenter yard, hauled to the field, and installed. The panels consisted generally of plywood and shiplap facing, nailed to 2 x 4 studs. The panels were tied together by Universal form ties to prevent their spreading. The forms were oiled before they left the yard.

It was not possible to start with the biggest boxes, and cut the panels down to the next smallest size. The grading lay in such a way that culvert forms had to be built as the excavation crew worked. It was unfortunate, but nonetheless that was the field condition.

As a rule, the smaller boxes were poured in two pieces. The floor was poured first, and the walls and top came in the next pour. On the largest

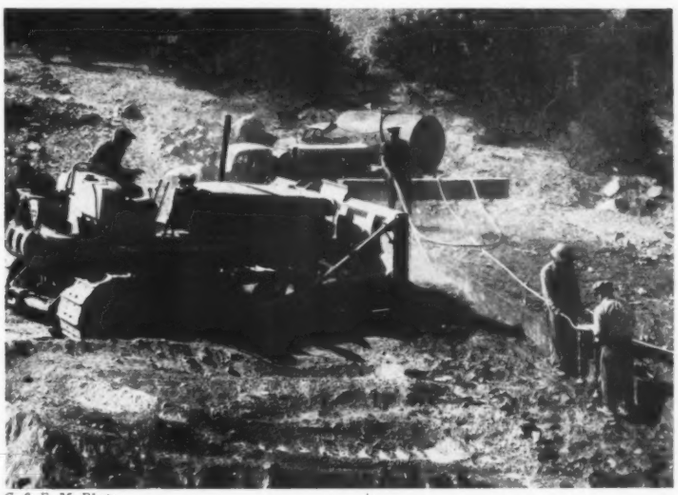
(*Concluded on next page*)

C. & E. M. Photo

Sinking a hole for the blasting on the Skousen-Hise Contracting Co.'s $1,600,000 contract. About 8 sticks of gelatin were used. One man pours Du Pont 40 per cent bag powder into a hole, while the other rigs up a stick of powder with a blasting cap.

C. & E. M. Photo

Men guide a concrete pipe into place in Tijeras Canyon. At inaccessible spots like this, the pipe was handled by a Michigan crane.



C. & E. M. Photo

Culvert construction on U. S. 66. The D8 dozer has just pushed a lift of dirt into the culvert. A man waters with a hose and a Gunderson-Taylor tamper compacts the soil.

culverts, the pouring had to be done in three lifts, with the top, of course, going on last.

Two small manual batching plants were spotted around at various places near the culvert pours, and sand and aggregate were proportioned there. Trucks then hauled this material to the two 16-S CMC concrete mixers, which turned out the finished product. Water, cement, and air-entraining agent were added at the mixer. The culverts were cured for 7 days, using wet burlap.

It was well toward late summer before the new pathway for U. S. 66 was carved through the pinon-studded mountain canyon. Then the granular ballast course was hauled in and processed, and later on, the hot-mix paving will be laid.

A Historic Canyon

When the new highway is finished, and transcontinental travelers zip through the country at high speed, they may not realize that they are traveling through some of New Mexico's historic country.

The pass between the Sandia and Manzano Mountains, over which the new highway will run, was used for centuries by Indians, Spanish explorers, trappers, traders, and forty-niners. Both mountain ranges top 10,600 feet. Canyons crossing at the village of Tijeras resemble opened scissors, which gave the place its Spanish name. Some 25 minerals have been found in this area, and there is some gold still panned near Tijeras.

The project was designed and is being built under the general supervision of State Highway Engineer B. G. Dwyre. R. M. Howard is his assistant, and field supervision is under the direction of Resident Engineer Charles O'Bannon.

The new 5-man Highway Commission, incidentally, represents an effort by Governor Mechem to build a stronger commission on a more nonpartisan basis than before. Ralph Jones is President of the Commission, and the others include G. D. Hatfield, T. T. Mann, Tito Valdez, and T. J. Heimann. For the first time in the state's history, one of the members, T. T. Mann, is a registered professional engineer. Two of the Commission members are Democrats; three are Republicans.

If the major improvement job on U. S. 66 is any indication of future accomplishments, the new Commission is off to a good start.

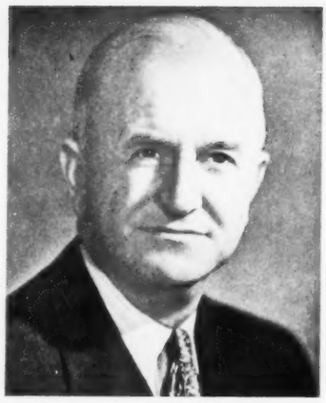
Heil Chicago Representative

Charles T. Scott has been appointed special sales representative in the Chicago area for The Heil Co., Milwaukee, Wis. Mr. Scott will handle the complete Heil line of earth-moving equipment, transport tanks, truck bodies, etc.

Moles' 1952 Awards

The Moles, New York association of tunneling and heavy-construction men, recently announced the winners of its member and nonmember awards for 1952. These awards are presented in recognition of outstanding service to the American construction industry. The nonmember recipient is Stephen D. Bechtel, President of The Bechtel Corp., San Francisco; the member recipient is Charles B. Spencer, President of Spencer, White & Prentis, New York.

Mr. Bechtel was director and member of the executive committee of Six Companies during the construction of Hoover Dam, and on the east crossing for the San Francisco Bay Bridge his firm was a part of Bridge Builders, Inc., on pier construction. Previous to World War II The Bechtel Corp. undertook defense construction on Wake, Midway, Guam, Johnston, and the Hawaiian Islands; and during that war the firm built numerous industrial plants, air bases, and refineries, as well as a section of the Big Inch oil pipeline from Texas to the east coast. Other wartime activities of the firm included the construction of military bases in Arabia (where it is now building pipelines) and help in the construction of ocean-going vessels for war service. The Bechtel Corp. has been engaged in many U. S. pipeline jobs since the war, and Mr. Bechtel, as a partner in Bechtel-McCone, directed construction of the Canol Pipeline in Canada. Bechtel companies include Bechtel Constructors, Bechtel International Corp., International Bechtel, Inc., and Compania Bechtel, S. A.



Left, Stephen D. Bechtel, President of The Bechtel Corp., San Francisco; right, Charles B. Spencer, President of Spencer, White & Prentis, New York City. Mr. Bechtel is the winner of The Moles' nonmember award for 1952; Mr. Spencer receives the member award. Presentation will be made at The Moles' Award Dinner, February 6.

Mr. Spencer has worked at various jobs in his time—railroading, tunneling, architecture, foundations, and underpinning. On his return from World War I he joined E. A. Prentis and Lazarus White in forming Spencer, White & Prentis, which, after 32 years, is still going strong and undertakes contracts all over the world. Some of the firm's jobs are harbor work in Persia, airports in the Bahamas, a bridge in Cuba, dry docks, tunnels, four sections of the New York subway system, the building of 100 tankers in Mobile, locks and dams on the Mississippi River, and foundations and underpinning jobs in many places. Mr. Spencer's latest achievement is the underpinning of the White House. He served two terms as President of the General Contractors Association of New York and during that time was active in the revision of the New York City Building Code—a job he had undertaken twice before, in 1916 and in 1936.

The Chairman of The Moles Award Committee—George Ferris, Vice President and General Manager of Raymond Concrete Pile Co.—will present the awards at The Moles Award Dinner at the Waldorf-Astoria Hotel, New York City, on February 6.

Corrosion-Protection Data

A 6-page bulletin on corrosion-resistant coatings has been issued by Permolite, Inc., Hamilton Ohio. It includes illustrations and a list of typical applications. The coatings may be applied by brush, spray, or dip, and may be air-dried or baked.

The folder points out that the manufacturer offers an experimental service, in which test or actual parts are coated and returned to the inquirer. There is no charge or obligation for this service.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 379.

General's Model 320 excavator is a ¾-cubic-yard machine manually controlled. Safety, accessibility of parts, and smooth, quiet running were features stressed in its design.

New Excavating Unit

The Model 320 ¾-cubic-yard excavator and material handler is announced by The General Excavator Co., Marion, Ohio. It is fully convertible to shovel, clamshell, crane, pile-driver, dragline, and hoe work. The standard shovel boom length is 18 feet 8 inches, with a dipper handle of 15 feet 3 inches. Standard crane boom length is 35 feet. The crawler is 11 feet 4 inches with 20, 25, or 30-inch treads available.

The Model 320 is manually controlled. Twin Disc clutches are used for swing and travel motions, for raising and lowering the boom, and for shovel retract. Contracting band clutches are used on the hoist drums. Independent travel is optional. The crawler base, machinery side frames, and the deck are made of castings and rolled structural-steel shapes. Machinery mounted on the superstructure is placed well back on the deck, giving stability and increased lifting capacity with a minimum of dead counterweight, the company claims. Ground bearing pressures are low.

The company points out that special attention has been given in design to present a smooth and quiet-running machine, with safety a prime factor. The reversing gears on the swing shaft, and the deck gears, are enclosed and run in oil. Antifriction bearings are used on all continuously running shafts. The boom hoist has a spring-set cam-released band brake, which is automatically set when the clutches are disengaged. Positive swing lock or friction swing brake, or both, can be provided. The cab floor plates are of antiskid design. Where gears are not completely enclosed, they are guarded, for clean and safe operation.

Working parts are designed for easy removal without disturbing other parts. The swing gear is separate from the crawler center casting and can be replaced separately. The boom-hoist unit bolts into the upper frame and can be removed from the supporting brackets without removal of the brackets.

The boom hoist is the worm and worm-wheel type, carried on antifriction bearings. It is raised and lowered under power, using the clutch on the countershaft for raising and a separate clutch for lowering. The cab is designed for easy access to the machinery, and to give the operator plenty of room. All controls are grouped within easy reach.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 346.

Darakote Sales Engineers

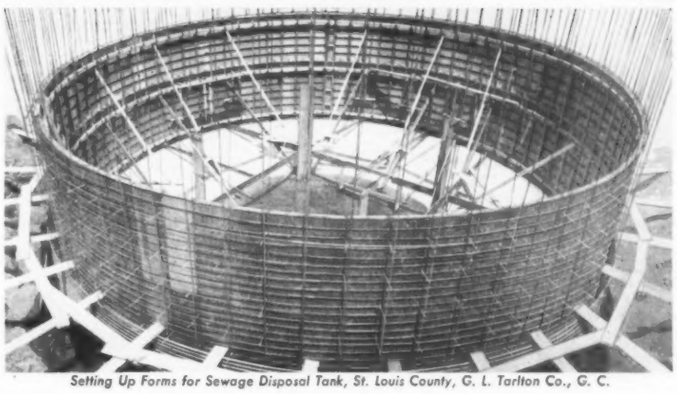
The appointment of two new sales engineers forms part of an expanded distribution program for Darakote, an antistripping compound manufactured by Dewey & Almy Chemical Co., Cambridge, Mass. Arthur B. Summers will make his headquarters at White Plains, N. Y., to serve the eastern states; and Frank D. Gaus, headquartered at San Leandro, Calif., will take care of customers in the west.

Darakote is an organic chemical which, when incorporated in bituminous materials, improves adhesion to asphalt-paving aggregates, particularly in the presence of moisture, the manufacturer says. It has already been largely used in the east.

Lightweight Chain Saw

A broadside highlighting the features of the Woodlot Wizard 16-inch chain saw is available from Lombard Governor Corp., Ashland, Mass. Its features include an automatically oiled chain, two-position handling for bucking or felling, close-to-ground cutting, and all-purpose use. Illustrations and complete specifications are provided for each model.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 290.



Setting Up Forms for Sewage Disposal Tank, St. Louis County, G. L. Tarlton Co., G. C.

Symons Forms for Curved Walls

Symons Rib panels are used with V-shaped fillers at each joint. Wedge-bolts secure the 3 pieces together and also hold the ties in place. Curved walers or 1"x6" flat walers may be used for alignment.

Contractors report savings of $5,000.00 on forming costs of Sewage Disposal Plants.

Symons offers a complete engineering service. Send plans for your next job and get complete layout and cost sheet—no obligation. *Symons Clamp & Mfg. Co., 4251-A2 Diversey, Chicago 39.*

Complete working weight of this 3-cubic-foot portable bituminous paving or patching mixer is 1,200 pounds.

A Bituminous Mixer

A portable batch-type mixer for hot, heated, or cold bituminous mixtures is announced by K. E. McConnaughay, Painters and Decorators Bldg.,Lafayette, Ind. The Model HTD-S has a 3-cubic-foot capacity per batch. Heat is supplied by two oil-burning torches. Hot mixtures may be heated up to 300 degrees F and cold mixtures are prepared in the conventional manner.

The complete working weight of the mixer is 1,200 pounds. It is trailer-mounted on two rubber-tired wheels and is powered by a 6-hp air-cooled engine. It can be used with limestone, slag, traprock, gravel or sand, and emulsified asphalts, cutbacks, tars, or asphaltic cement to produce asphaltic concrete, sheet asphalt, sand asphalt, or mastic asphalt mixtures. Permanent hot patches may be placed in zero weather, and premixed or stockpile mixtures may be run through the mixer, heated, and placed on the spot, the company says.

Further information may be secured from the company by requesting Bulletin 117-A. Or use the Request Card at page 16. Circle No. 304.

New Line of Trucks

New Style Liner trucks with Power Chief engines have been announced by Federal Motor Truck Co., Detroit 9, Mich. The 3400 Series comprises three models. Gross vehicle weights range from 23,000 to 25,000 pounds, with tractor-trailer ratings to 45,000 pounds, depending on models. Units are available in eight wheelbase lengths from 136 to 250 inches, with cab-to-axle dimensions from 60½ to 174½ inches. Chassis and cab weight of the shortest-wheelbase units starts at 7,210 pounds.

The Power Chief 6-cylinder valve-in-head engine has a 371-cubic-inch displacement and develops 145 hp at 3,000 rpm and 290 foot-pounds of torque at 1,400 rpm. The engine features positive valve rotation, sodium-cooled and stellite-faced exhaust valves with bronze guides, durable valve inserts, and built-in oil cooler. It also has a high-lift camshaft, full-length water jacketing, and directional cooling.

The rubber-mounted cab is of all-steel construction with a one-piece full-vision windshield. A fresh-air heater and defroster, thermostatically controlled, is also available.

Truck frames have deep thick channels with sturdy cross-members, and the front bumper is frame-mounted for extra durability, Federal says. A Swing-Lift fender is designed to lift up and lock out of the way to give quick access to engine, accessories, steering, front brakes, etc. Hypoid gear axles and radius rod drive are standard on all models, with a choice of single-speed, 2-speed double-reduction, and double-reduction rear axles. Units have a 5-speed direct-drive transmission with overdrive transmission optional. Hydraulic brakes are standard as are 9.00 x 20 tires, while air brakes and larger tire sizes can be obtained. Other standard equipment includes a 13-inch clutch and 40-amp generator.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 269.

Admixture for Concrete

Literature describing Tricosal, an admixture to improve the waterproofing quality and workability of concrete, is offered by The Tricosal Co., 1709 W. 8th St., Los Angeles 17, Calif. The liquid concentrate is claimed to render concrete completely impervious to water even under high pressures (2,800 psi). According to the circular, it will not alter the setting time of concrete and will not have a harmful effect if accidentally used in proportions other than those recommended.

The company claims that Tricosal will provide a plastic cohesive concrete, prevent segregation of aggregates, and increase strength and bond. It recommends its use for concrete and lightweight concrete, mortar, cement plasters, Pumpcrete, and Gunite. The literature lists specifications, describes typical jobs, and provides other data.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 295.

Data on Metal Protection

An 8-page booklet on Anchorite 100, a paint-anchoring corrosion-resistant phosphate treatment for metals, has been issued by Octagon Process, Inc., 15 Bank St., Staten Island 1, N. Y. It describes in detail the common causes of paint failure and how they can be prevented. It explains and illustrates methods of application—immersion and spraying—of Anchorite 100.

A separate discussion of typical products to which the treatment can be applied is also illustrated. The booklet points out that Anchorite 100 is one of the prepainting treatments that meets the specifications for Class C (Type II) finish in U. S. Army Specification No. 57-0-2C, and JAN-C-490, Grade I.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 381.

Bulletin on Forming System

A 4-page illustrated bulletin on a forming system for concrete-wall construction has been released by Symons Clamp & Mfg. Co., 4251 Diversey Ave., Chicago 39, Ill. It explains in detail the entire system including panels, two-way form tie, connecting bolt, tightening wedge, wale tie and wale plate, corners, and fillers. It gives assembly details, lists standard sizes, and includes information on wood forms, plywood forms, plywood forms with magnesium frames, and wood forms with steel ribs.

In addition, the bulletin explains the Symons form-system service, including its rental with purchase option; the availability of hardware, fittings, and other supplies; and the complete engineering service open to all customers. The bulletin also covers briefly the Symons column clamps and safety shores.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 306.

Mobile Radio Equipment

Three circulars on adjacent-channel equipment for mobile radio service have been prepared by Link Radio Corp., 125 W. 17th St., New York 11, N. Y. They describe three new frequency-modulated transmitter-receivers designed to meet all FCC requirements and afford trouble-free operation in the frequency range of 25 to 50 megacycles. These sets have nominal outputs of 10, 30, and 60 watts respectively.

The basic mechanical design of the sets incorporates a transmitter and receiver mounted on a single chassis, integrated with a vibrator power supply under one cover. Each of the three units is furnished complete with all accessories for 2-way communications in mobile operations. Principal characteristics, specifications, illustrations, and a list of accessories are given for each of the sets.

Literature on the Type 2750 radio units may be obtained from the company, or by using the Request Card at page 16. Circle No. 382.

Koppers Promotes Denny

Henry A. Denny is Production Manager of the Engineering & Construction Division of Koppers Co., Inc., Pittsburgh, Pa. Formerly Assistant Production Manager, he succeeds Frank Chambers, who has resigned. Mr. Kenny joined Koppers in 1927.

Lengthened Runway Is Prepared for Jets

Improvements at Ohio's Lockbourne Air Force Base Include Taxiway and Apron; Three 34-E Pavers Work Double Shift

• IN preparation for use by 4-engine jet planes of the U.S. Air Force, hurried improvements were completed last year at Lockbourne Air Force Base, located 10 miles southeast of Columbus, Ohio, in Franklin County. Supervised by the U. S. Army Corps of Engineers, Huntington (W. Va.) District, the work included extending and widening an existing runway, and the construction of new taxiways and apron. The finished runway at 10,500 feet is one of the longest in the country.

Two of the larger contracts consisting of grading, paving, and other appurtenant features were awarded to the W. L. Johnson Construction Co. of Columbus, Ohio, on estimated low bids of $1,357,686 and $5,166,084 respectively. The first phase of the work, covering the reconstruction and extension of the northeast-southwest runway, started on April 13 and finished on August 21, 1951, with the runway in operation over a month ahead of schedule. The second and larger contract for the taxiways and aprons got under way on June 1 and was completed on schedule last year.

Lockbourne Air Force Base was built during the last war, with the W. L. Johnson Construction Co. also handling part of the work. It has four runways —three at 5,500 feet (east-west, north-south, northwest-southeast) and a 5,614-foot northeast-southwest runway. The 8-inch-thick 150-foot-wide reinforced-concrete pavements are laid on a 6-inch stabilized base course. On each side the concrete runways are flanked by 75-foot bituminous shoulders. The effective length of the northeast-southwest runway has been increased to 7,079 feet by utilizing a 1,465-foot taxiway that continues the pavement in the same direction off the southwest end of the runway. This taxiway K, 100 feet in width, has a 7-inch RC pavement laid on a 6-inch stabilized base course.

Runway Extension

Because of the great length of runway that jets require for takeoffs and landings, it was decided to extend the 7,079-foot northeast-southwest runway, longest at Lockbourne, to 10,500 feet. The 3,421-foot extension was made at the northeast end with a 200-foot-wide RC pavement. The existing pavements of the 150-foot runway and 100-foot taxiway were widened proportionally so that the entire 2-mile runway has a 200-foot pavement. From the center line the new pavement slopes at the rate of 0.667 per cent for the initial 75 feet; the slope for the remaining 25 feet to the edge of pavement is 1.5 per cent. The latter slope is continued out over the 200-foot shoulders that border the runway pavement. At each end of the runway, additional length is pro-

(Continued on next page)

C. & E. M. Photo

The back paver drops a batch of concrete on the runway in front of a Jaeger auger-type spreader. W. L. Johnson Construction Co., Columbus, Ohio, was the contractor.

vided with clear zones, graded and compacted areas 1,000 feet long x 1,500 feet wide.

Two factors—the design of the runway for jets, and the decision to make use of the available runway and taxiway—developed some variations in cross sections in different parts of the pavement. For clarity of control the runway was divided into five zones—A, B, C, D, and E—running from southwest to northeast. Zones A and E at the two ends are each 1,000 feet long; zone B is 465 feet; zone C is 5,614 feet; and zone D is 2,421 feet.

In zone A, the existing 7-inch concrete pavement of the 100-foot taxiway is overlaid with a 6-inch course of slag concrete reinforced with steel-wire mesh 2 inches below the surface. A 50-foot widening strip on each side, laid in 25-foot lanes, consists of 12 inches of concrete—an 8-inch course of regular concrete on the bottom, topped by a 4-inch surface course of slag concrete, with the reinforcing mesh placed between the two courses. Zone E, new construction throughout, is composed of 8 inches of regular and 4 inches of slag concrete on top, with the reinforcing between the two. Where the western end of the east-west runway meets the new runway, the triangular-shaped intersection area is 6-inch slag concrete overlying the existing concrete.

Slag concrete, used at the ends of the runways where the jets pause momentarily before the takeoff, was specified because of the greater resistance to heat transfer that slag aggregate offers as compared to conventional aggregate.

Zoned Construction

In zone B, the remainder of the existing 7-inch concrete pavement of the 100-foot taxiway is overlaid with 6 inches of bituminous concrete—3½-inch binder and 2½-inch surface course. The 50-foot widening on each side, laid in 25-foot lanes, is an 11-inch regular concrete pavement with the steel reinforcing 4 inches below the surface.

Zone C, which takes in the 5,614-foot original runway, has the existing 8 inches of cement-concrete pavement, 150 feet wide, covered with the two courses of bituminous concrete totaling 6 inches. Along each side a 25-foot strip of the old bituminous shoulder was removed and replaced with an 11-inch RC slab. These cement-concrete lanes are flanked by a 30-foot strip of bituminous concrete, 6 inches thick on the inside and tapering off to nothing at the edges.

The 2,421 feet of new construction in zone D is 11-inch RC pavement for its full 200-foot width. Where the existing runways and taxiways intersect the reconstructed runway, their surfaces are overlaid with bituminous concrete for several hundred feet on either side of the intersection so as to maintain smooth transitions.

In addition to the cement-concrete and bituminous-concrete paving features, the runway contract included the usual clearing, grading, and subgrade preparation, together with the installation of ducts under the runway extension, and the seeding of the shoulders.

Apron Contract

The existing apron at Lockbourne is laid out in a big arc at the northern end of the field. The new apron area, off the northeastern end of the existing facility, is about 1,000 feet from the center line of the long runway. Somewhat irregular in shape, the largest section measures approximately 1,475 feet x 1,070 feet. It is of reinforced-concrete construction, 12 inches thick, with the wire mesh laid 4 inches below the surface. Taxiways of similar construction and 100 feet wide connect the apron with the runways. Where existing concrete pavement is employed, the existing surface is capped with bituminous concrete as in the runway contract.

Besides the paving items the apron contract including clearing, grading, subgrade preparation, duct installation, drainage system, and seeding.

In the cement-concrete pavement covering both contracts, expansion joints were used only at the ridge line in the apron area, and at tie-in intersections of runways and taxiways. At the longitudinal joints, adjoining lanes were tied together with 1 x 20-inch round bars spaced on 15-inch centers at mid-depth of slab. For future expansion 1-inch keyways were placed in the form along the edge of the outside lane. Longitudinal joints were edged with a ¼-inch-radius tool to a depth of one inch.

Contraction joints, cut into the hardened concrete, are on 25-foot centers. Their depth is one-quarter the thickness of the slab and their width is ⅛ to ¼ inch. Thus in a 12-inch pavement the contraction joints are 3 inches deep. Longitudinal and contraction joints in the apron and in the 1,000-foot zones A and E at the ends of the runway were poured with Aero-Sealz, a rubber compound that is especially resistant to the heat of jet fuel. The other joints were poured with the rubber compound Sealz.

Grading

Grading items in both contracts covering excavation, embankment, and removal of existing pavement totaled over 850,000 cubic yards. The soil in this area is a combination of clay and

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Lengthened Runway Is Prepared for Jets

(*Continued from preceding page*)

sand, light in weight. Cuts and fills were fairly shallow, with the grade held close to the contour of the ground. For the long-haul material, W. L. Johnson Construction Co. used three 13-yard bottom-dump Euclids that were loaded either by a Koehring 604 or a 605 dragline equipped with Hendrix 2-yard buckets. The draglines also handled drainage excavation and pipe work. Short-haul dirt was moved with five LeTourneau 15-yard Carryall scrapers pulled by Caterpillar D8 tractors. Two D8 dozers leveled off the fills which were compacted by a pair of Southwest tamping rollers pulled by D8 tractors. A Caterpillar No. 12 motor grader did the final shaping.

Part of the grading operations was subbed out to Roy Kohl of Springfield, Ohio, who operated a fleet of five Euclid 20-yard motor scrapers. Compaction units working with these machines included two LeTourneau tamping rollers, one pulled by an Allis-Chalmers HD-14 crawler tractor and the other by a LeTourneau rubber-tired bulldozer. The latter also helped spread the fill lifts. Final shaping was done with a small Bucyrus-Erie scraper pulled by an A-C HD-14 tractor, and an Austin-Western 99 motor grader. A pair of 2,000-gallon tank trucks were on hand to wet down the fills when necessary.

L. & L. M. Photo

An R-B Finegrader at work on the Lockbourne Air Force Base paving.

Baker & Hickey Co. of Columbus, Ohio, was subcontractor on part of the drainage work, including the installation of box culverts with precast-concrete gratings. A Gradall machine handled a variety of jobs including excavation of trenches for pipe and ducts, and some fine-grading.

Batch Plant

While the grading was in progress, the general contractor was busy setting up a concrete batch plant in preparation for laying the 546,000 square yards of cement-concrete pavement in the project. With the exception of one sand bin, the entire plant was contained within a single tract of land adjoining the air base, and served by a siding of the Norfolk & Western Railroad. The sand bin was just within the base property, and next to a track that enters the Lockbourne field. The contractor's siding was large enough to accommodate 80 cars at a time.

Sand and gravel aggregate for the mix was delivered by rail from the plant of the American Aggregates Corp. in Columbus. The Standard Slag Co. of Hamilton, Ohio, furnished the slag, which was also shipped in by rail. Material from hopper-bottom cars was unloaded into pits formed from steel sheet piling driven under and adjacent to the spur track. From there Koehring cranes—701, 605, or 604—loaded the aggregate into storage bins. The 1½-inch slag aggregate was stored in a Blaw-Knox 100-ton bin; the gravel was contained in two Heltzel 100-ton bins—one storing 1½-inch material, and the other holding ¾-inch and 3-inch sizes in its two compartments. The 100-ton sand bin inside the air-base gate was a Blaw-Knox 2-compartment unit. One side held the sand for the regular concrete, while mason sand, of finer gradation for use in the slag concrete, was stored in the other compartment.

Bulk cement was employed throughout, with about 16 per cent natural cement used in the regular concrete to ease the pressure on the demand for portland cement which at times was difficult to obtain. Louisville natural cement was shipped from Speed, Ind., while the portland came from Universal Atlas at Fairborn, Columbia at East Fultonham, Superior at Portsmouth, and Alpha at Ironton—all Ohio plants. From the Fairborn mill some of the cement was trucked to the batch plant, but the rest came by rail. Three Heltzel bins held the cement—a 400-barrel unit on the siding for the natural and a 300-barrel bin also on the siding for the portland, with another 400-barrel bin off to one side for the portland cement that was trucked in.

(*Continued on next page*)

The latter had two additional units of 300 and 500-barrel capacity set up alongside the operating bin.

The Mix

The portland cement was air-entrained with Vinsol resin at the mill, and more of the agent was added at the paver, as necessary, to maintain an air content of 4 per cent. The surface-saturated dry weights of a typical batch of slag concrete were as follows:

Portland cement	790 lbs
Fine aggregate—sand	1,683 lbs.
Coarse aggregate—slag 1½-inch	2,108 lbs.
Water	388 lbs.
Total	4,969 lbs.

In the regular concrete a typical batch had the following weights:

Portland cement	631 lbs.
Natural cement	143 lbs.
Fine aggregate—sand	1,179 lbs.
Coarse aggregate—¾-inch	811 lbs.
Coarse aggregate—1½-inch	1,950 lbs.
Coarse aggregate—3-inch	489 lbs.
Water	340 lbs.
Total	5,543 lbs.

Water for the mix was obtained on the air base from 200-foot wells. The mason sand used in the slag concrete and the sand for the regular concrete were graded as follows:

	Per Cent Passing	
Sieve Size	Concrete Sand	Mason Sand
No. 4	95–100	...
No. 8	80–90	90–100
No. 16	60–80	65–85
No. 30	30–60	35–65
No. 50	12–30	15–25
No. 100	2–10	2–5

Batches were hauled in a fleet of trucks averaging 24 in number—18 Fords holding two batches, and 6 GMC's holding three batches. The average one-way haul distance was 2 miles. Trucks first drove under the coarse-aggregate bins at the far end of the plant, then moved ahead under the cement bins to continue into the air base for a stop under the sand bin. No trucks were required to back up in the loading operations.

Paving Preparations

About 11,000 linear feet of Blaw-Knox forms were assembled, of which some 3,000 feet were of 6-inch depth for the recapping work, and the remaining 8,000 feet were 9-inch forms. Under these latter forms, 2 or 3-inch wood spacer strips were bolted to give the 11-inch and 12-inch forms that were required for paving in the different zones. Some refabricating was done to a portion of the forms in the shops in order to provide an extra metal strip on the outside for supporting the 1 x 15-inch dowels. The dowels, supplied by Pollack Steel Co., went through holes made in the sides of the forms.

Between the forms the grade had purposely been left about 0.2 high. This surplus material was removed by R-B Finegraders, of which there were two on the job. They were redesigned to cut to the full 12-inch depth where that paving thickness was required. Behind the Finegraders the subgrade was rolled by a Huber 10-ton 3-wheel roller and wet down, while the sides of the forms were oiled. The Finegraders were also used in cutting out a keyway in the subgrade adjoining the existing pavement where the widening was laid. This keyway was 5 feet wide x 3 inches deep, extending below the level of the rest of the widening strip. The trench was rolled by a Buffalo-Springfield 3-ton tandem roller.

C. & E. M. Photo

The batch-plant layout for W. L. Johnson's contract. A Koehring 701 loads the Heltzel 100-ton bin at left and a Koehring 605 charges the 100-ton Heltzel at right.

Most of the paving was done in 25-foot lanes, but 18-foot, 20-foot, and 23-foot 3-inch widths were also required. In general the contractor endeavored to pave the odd widths as inside lanes between previously laid slabs. Careful planning was stressed in the sequence of operations to keep the job moving at peak efficiency. The Lockbourne project differed from a routine paving contract in that two types of concrete were used—regular and slag; three depths of slag—6, 11, and 12-inch—were required; and two different weights of steel-mesh reinforcing were specified. Furthermore, with the many intersections involved, the paving was divided up into over 300 separate pieces, with the maximum straight run only 3,700 feet in length. Because of these numerous sections, the pickup and moving of the paving and finishing equipment was a major factor in laying out the work.

Three 34-E Pavers Used

Paving was done with three Koehring 34-E Twinbatch pavers working in a variety of combinations. In some instances on the shorter sections, con-

(Continued on next page)

Lengthened Runway Is Prepared for Jets

(*Continued from preceding page*)

crete was laid in four different lanes at the same time. At times the three pavers might be concentrated on a single lane. Usually where a stretch of 500 feet or more was involved, two pavers teamed up while the third worked alone in a separate operation. Accompanying a paver were a pair of tank trucks holding 1,500 or 2,000 gallons of water. While one was supplying the paver, the other was getting refilled.

Despite this massing of machines at one spot, they were used with the utmost flexibility. To suit the varied conditions, whether on base or top or both courses, the pavers were placed either on the same side or on opposite sides of the lane being paved. They might work boom to boom, moving in the same direction or in opposite directions, with the water trucks alongside on the subgrade or up on the previously laid pavement. But in every case the setup was planned in advance as the most desirable for that particular bit of work.

With a setup of two pavers, the major equipment in their wake included two concrete spreaders, two transverse finishing machines, a longitudinal float or finisher, and a spray rig for the curing compound. Where a single paver was operating, the equipment following consisted of one spreader, one transverse finisher, a longitudinal finisher and a spray rig.

Finishing Operations

Thus in a typical operation where a 25-foot lane was paved with 12 inches of concrete, two pavers worked on the subgrade of the 25-foot adjoining lane. They faced each other, boom to boom, with their respective batch trucks backing in to the skips from each side. Both pavers moved in the same direction. Water for the first paver came from the supply truck on the concrete across the lane that was being laid. The water truck for the second unit moved along the subgrade between the two pavers.

The first paver deposited concrete on the subgrade in front of a Blaw-Knox spreader that struck it off to a depth of 8 inches. A Maginniss Hi-Lectric vibrator, on each side at the rear of the spreader, vibrated the concrete as it was placed along the forms. American

C. & E. M. Photo

Two Koehring 34-E Twinbatch pavers, laying a 25-foot runway lane, face each other so batch trucks can get in at both sides. The back paver is at the left.

Steel & Wire mesh reinforcing was then laid over this bottom course, and covered with concrete from the back paver. This 4-inch top course was spread out by a Jaeger auger-type spreader with a transverse screed at the rear. A pair of Maginniss vibrators on the second spreader vibrated the upper lift of concrete along the forms.

Behind the two spreaders came two finishing machines, first a Jaeger Type H followed by a Jaeger-Lakewood Type X equipped with a diagonal screed. Following the transverse finishers was a Koehring Longitudinal Finisher, after which the surface of the slab was checked with a straightedge and touched up, if necessary, with a hand float.

Next in line was a Heltzel Flex-Plane machine carrying in front a 3-ply canvas belt, 12 inches wide x 28 feet long, to smooth out any surface irregularities. The belt was secured with snap rings so that it might be easily removed and washed out. The Flex-Plane machine also served as a spray rig in applying Permite V-167 curing compound.

Cutting the Joints

For quick pickup and shifting of equipment from lane to lane after completing a paving section, the contractor employed two M-20 Tournacranes. Both were mounted on rubber-tired carriages. One with a 20-foot boom was moved about by a D8 tractor. The other was pulled by a Koehring rubber-tired tractor, used where long hauls over pavement already laid were involved. These cranes picked up the heaviest pieces of finishing equipment either from the sides or from the ends. In the case of a spreader fitted out with vibrators, generator, and light plant,

(*Continued on next page*)

C. & E. M. Photo

A Clipper concrete saw cuts contraction joints in the 12-inch-thick slab.

the weight was as much as 33,000 pounds.

Instead of the conventional cutting of the transverse contraction joints during the finishing operations, before the concrete set up, the joints on this project were cut in the hardened concrete, usually from 8 to 12 hours after the pavement was laid (although this time increased considerably as the weather became cooler). This method was expected to produce smoother joints than by hand edging, and to prevent spalling of the surface from disturbing the concrete as the finishers worked over a wet joint. Three Clipper concrete saws were available for cutting the joints, spaced at 25 feet.

The saws followed a blue chalk line that was snapped across the pavement. Water for quenching the blade was supplied by a tank truck, and forced through a ¾-inch hose line at full pressure by a Jaeger 1½-inch pump. Blades were 12-inch diameter x 0.125-inch thick, and cut a joint 3 inches deep x ⅛ to ¼ inch wide x 25 feet long in about six minutes. One blade usually cut from 1,200 to 1,400 feet of joints before dulling.

In pouring the joints with Sealz and Aero-Sealz, the cracks were carefully cleaned out by blowing compressed air through them before filling. The rubberized compound was first preheated to 350 degrees F in a White kettle, then transferred to a second kettle where the temperature of the material was raised to 425 degrees F and maintained at that heat for two hours. After that it was put into Hecker pouring cans for the actual filling of the joints. The pouring was done in three to four passes to insure complete filling of the joints.

Work Two Shifts

To meet the time demands of the contract, paving operations were carried on over two 8-hour shifts—from 7 a. m. to 3 p. m., and from 3 p. m. to 11 p. m. Occasionally even the 16-hour working day was exceeded when it was expedient to finish a section by working overtime. Maximum production with two pavers occurred on August 17 when the pair of 34-E Twinbatchers mixed 2,175 batches in 18 hours while paving the 3,400-foot taxiway. The record number of batches produced 8,700 square yards of 12-inch pavement, or 3,132 linear feet of a 25-foot lane.

For night work each piece of finishing equipment carried a Kohler 1½-kw light plant for supplying current to the G-E 200-watt lightweight bulbs that were used without reflectors. Another such plant was mounted on a trailer with a bank of five floodlights and used behind the paver for finishing and general cleanup work. Some pickup trucks were outfitted with 100-amp generators and special headlights to help out with the artificial lighting.

Bituminous Concrete

On the bituminous-concrete work, the general contractor furnished the material and delivered it to the site where it was laid under a subcontract by Shelley & Sands Co. of Thornville, Ohio. The plant-mix, totaling 138,700 tons, came primarily from two asphalt plants of the Columbus Bituminous Corp. and the Marble Cliff Quarries Corp.—a 9-mile and 18-mile haul respectively to the job site. American Aggregates Corp. supplied the gravel for the coarse aggregate used in the binder course, while the crushed stone for the surface course was furnished by the Marble Cliff Quarries Corp. The Ashland Oil & Refining Co. of Ashland, Ky., delivered to the plants the 100-120-penetration asphalt cement used.

Before the mix was laid, the existing pavement was given a tack coat of American Bitumuls RS-1 asphalt emulsion, applied at the rate of 0.15 gallon to the square yard. After a 24 to 36-hour curing period, the binder course was laid in 10-foot lanes to a compacted depth of 3½ inches for the runway; and two courses of 3 inches and 2½ inches for the apron—with a tack coat applied between them. Both Barber-Greene finishers and Adnun Black Top Pavers laid the mix which was then compacted by Buffalo-Springfield tandem rollers. A fleet of 25 Ford trucks hauled the material from the plants to the air base.

After the binder course was laid, it was given a tack coat of RC-1 asphalt, also applied at the rate of 0.15 gallon to the square yard. This was followed by a 2½-inch bituminous surface course for the runway and a 1½-inch surface course for the apron, laid in 12-foot 6-inch lanes, overlapping the joints in the binder course by at least a foot. The surface course was topped by a seal coat that consisted of a shot of RC-2 asphalt applied at the rate of 0.2 gallon to the square yard. Into this were rolled finely crushed stone grits, 15 pounds to the square yard, conforming to the following gradation:

Sieve Size	Per Cent Passing
⅜-inch	100
No. 4	85–100
No. 8	10–40
No. 16	0–10

Working a single 12-hour shift, the bituminous crews laid an average of 1,800 to 2,000 tons of plant-mix a day, reaching a production peak of 2,700 tons on one day.

Quantities and Personnel

Favorable weather conditions pre-

(*Concluded on next page*)

Lengthened Runway Is Prepared for Jets

(Continued from preceding page)

vailed at the Lockbourne Air Base for most of the 1951 construction season. From the middle of May to the middle of August only 20 hours of working time was lost due to inclement weather. That factor and the teamwork between the various branches of the armed forces and the contractors made it possible to finish the long runway well ahead of schedule.

The major items in the contract for the reconstruction of the northeast-southwest runway included:

Excavation	149,880 cu. yds.
Pavement Removal	4,560 cu. yds.
Concrete runway paving, 11-inch	88,000 sq. yds.
Concrete runway paving, 8-inch	31,000 sq. yds.
Slag-concrete surfacing, 6-inch	13,400 sq. yds.
Slag-concrete surfacing, 4-inch	31,000 sq. yds.
Cement	35,750 bbls.
Bituminous tack coat	35,300 gals.
Binder course	22,000 tons
Surface course	15,000 tons
Bituminous material, binder	1,100 tons
Bituminous material, surface	817 tons
Seal-coat aggregate	514 tons
Seal-coat bitumen	15,454 gals.

In the second contract for the construction of the aprons and taxiways, the major items were as follows:

Excavation	494,000 cu. yds.
Pavement removal	5,950 cu. yds.
Embankment	197,300 cu. yds.
Concrete paving, 12-inch	383,000 sq. yds.
Cement	180,750 bbls.
Bituminous tack coat	93,400 gals.
Binder course	80,000 tons
Surface course	21,700 tons
Bituminous material, binder	3,200 tons
Bituminous material, surface	1,300 tons
Seal-coat aggregate	1,400 tons
Seal-coat bitumen	35,000 gals.
Pipe, 15 to 66-inch	8,035 lin. ft.

The various contractors employed an average total of 950 on the project. The W. L. Johnson Construction Co. was represented by Richard Tangeman, Contract Manager; D. H. Criswell, General Superintendent; Fred Rowe, General Manager; John Cockrell, Paving Superintendent; and Estell Culler, Engineer. Robert Loughman was Superintendent for Shelley & Sands Co. in charge of the bituminous work.

For the Corps of Engineers, Karl C. Vogel was Project Engineer, assisted by H. R. Irwin. Willard F. Russell was Concrete and Asphalt Technician on the paving. The Huntington District is headed by Col. Walter Kreuger, Jr., District Engineer. Col. George W. Humbrecht is Commanding Officer of the Lockbourne Air Force Base.

Chemical Welding Aid

A plastic cement compound which acts like a jig to hold parts together, and will not deform, move, or swell during welding operations, has been announced by Eutectic Welding Alloys Corp., 40-40 172nd St., Flushing, N. Y. It is designed for assembling small lots where there is no time for metal jig construction.

Form-A-Jig compound may be used to hold parts for welding, brazing, and soldering; to hold broken sections together for tool salvage and similar maintenance; to shield or protect parts from flame; and for working with heat-treated or enameled sections. It may also be applied as a mold for low-melting metals such as Babbitt, solder, lead, aluminum, etc. It will not soil metal, mar surfaces, or corrode, the company claims.

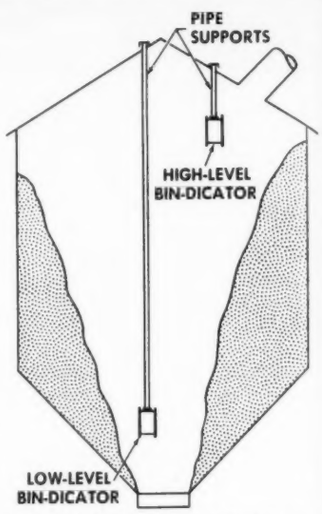
Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 386.

Hydraulic Accumulators

A 12-page catalog outlining the functions, construction, operation, and applications of hydro-pneumatic accumulators has been issued by Greer Hydraulics, Inc., 454 18th St., Brooklyn 15, N. Y. The units are essentially chambers in which the potential energy of an incompressible fluid under pressure can be stored against some dynamic force to do useful work. They also serve to smooth out pressure surges, provide sufficient fluid to compensate for loss due to leakage, and prevent shock pressures developed in the system from damaging the circuit components.

The booklet is fully illustrated and covers a number of accumulator applications in detail: as an auxiliary source of power for intermittent-duty systems, a leakage compensator, a means of operating secondary circuits, an emergency source for fluid power, a volume compensator, and a pulsation dampener.

This literature may be obtained from the company by requesting Bulletin 301, or by using the Request Card at page 16. Circle No. 364.



The Model CS bin-level indicator can be hung anywhere in a bin where there is a free flow of material to and away from the diaphragm.

Bin-Level Indicator

A bin-level indicator for large bins is announced by The Bin-Dicator Co., 13946-54 Kercheval, Detroit 15, Mich. The Model CS can be hung anywhere in the bin where there will be a free flow of material to and away from the diaphragm. This permits its use in bins containing materials which tend to build up on the bin walls and to flow down through the central area only, the company says.

The Bin-Dicator can be drilled and tapped to take any size of pipe up to 2 inches. The support pipe accommodates electrical wiring, making a conduit unnecessary. The installation can be easily moved up or down in the bin to operate at different levels, or be lifted out for inspection.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 371.

Webb Is Detrex Sales Mgr.

W. H. Webb is named Sales Manager of alkali products for Detrex Corp., Detroit, Mich., manufacturer of alkaline and emulsion cleaning materials. Mr. Webb has been with Detrex for ten years and has held various positions in the company.

The new Goodrich tire is designed for graders operating under especially tough conditions and where there is considerable rock.

New Rock-Type Tire

A tire designed for graders operating under especially tough conditions or where there is considerable rock is announced by The B. F. Goodrich Co., Akron 18, Ohio. It is made for semi-drop center rims and fits rim size 800 T. It has a cross section 13.2 inches wide with an outside diameter of 50.8 inches. The company points out that the tire has a maximum speed of 25 miles an hour, a maximum rated load of 6,600 pounds when inflated to 50-pound pressure, and makes 426 revolutions per mile.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 305.

Combination Tester

A combination coil, condenser, and circuit tester has been added to the line of motor service equipment made by King Electric Equipment Co., 9123 Inman Ave., Cleveland 5, Ohio. The Model G-212 Trouble-Shooter operates from a vehicle battery. Its calibrated spark-gap and neon tube tests ignition and magneto coils, sparkplugs, high-tension cables, distributor caps, and rotors. Coils are heated before they are tested. Battery ignition and magneto condensers can also be tested at 100, 200, and 500 volts. A power-pack furnishes 500 volts for locating trouble in vehicle wiring.

Model G-212 weighs 11 pounds and is 11 inches wide, 9½ inches high, and 5 inches deep. Its cabinet, finished in Hammertex baked enamel, has a handle so it can be carried easily.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 387.

Heavy-Duty Ripper

A heavy-duty ripper for use with large tractors has been announced by E. S. Hubbell Co., 730 Clermont St., Denver 7, Colo. Its design, the company says, prevents rock or other obstructions from jamming between the wheels and the teeth. This is a result of the yoke action carrying the wheels forward and away from the teeth when the wheels are lowered. The manufacturer claims that the ripper will hold the ground under all working conditions. Wheels can be raised by forward motion of the ripper when desired; backing up is not necessary. The cable anchorage at the rear of the frame, above the teeth, produces a direct pull at the lifting point, thereby resulting in less strain, Hubbell says.

The largest model weighs over 16,620 pounds and is fitted with three 3 x 9⅞-inch high-carbon-steel shanks. Center-to-center distance between the teeth is 3 feet 3 inches; depth of penetration is 3 feet. The removable points are fabricated of ½-inch plow steel, hard-faced with approximately 50 pounds of hard-surface rod. The machine is constructed of heavy-duty steel plate, reinforced and welded, on a well braced frame. Alloy steel is used where excessive strain or wear is apt to occur.

The new heavy-duty Hubbell ripper is designed to prevent jamming of rocks, boulders, and stumps between the wheels and the teeth.

The drawbar is designed to give high strength, ease of turning, and accessibility for replacement of wearing parts. The axles have Timken tapered roller bearings, sealed on each side of the hub by a labyrinth of steel and felt washers held in place by Tru-Arc snap rings to keep grease in and dirt out. A pusher plate is located at the rear of the ripper for quick contact by the pushing unit.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 340.

Winter's Tale: New Hampshire

In the Concord, N. H., garage, mechanics prepare a Chevrolet truck for Frink plows—tightening the wing bracket in back, installing a National hydro-clutch pump in front.

Shop Work on Trucks Prepares Them for Winter Maintenance; Two-Way Radio Installations Are a Big Help

By WILLIAM H. QUIRK,
Eastern Editor

• ALTHOUGH the 1950-1951 winter in New Hampshire was mild when compared with the past ten winters, State Highway Department officials prepared for this season as thoroughly as ever to counter snow and ice in whatever amounts it may arrive. Not too distant is the memory of the 1947-1948 winter when the average snowfall for the state totaled 97.6 inches. Last year it was only 56.5 inches, which was 23.3 inches below the average for the last 10 years. Yet some snow was recorded throughout seven months, from October through April, and at Pinkham Notch in the White Mountains the snowfall last winter totaled 142.6 inches.

During last winter the state expended $1,348,388.23 for winter maintenance on 3,238 miles of primary and secondary roads on the state highway system. The items involved, in the order of their cost, included: chlorides for ice prevention; plowing; sanding; spreading chlorides; snow fence; night weather patrol; and chlorides for sand. The chlorides used totaled 22,654 tons, of which 22,195 tons was for sodium chloride and 459 tons for calcium chloride. Nearly 38,000 cubic yards of material was spread in sanding the roads, and over 1,000,000 linear feet of protecting snow fence was erected. The

(Continued on next page)

This orange Chevrolet 3600 repair truck is one of three the Department owns. At the left, Mechanic Fred K. Hodgman spreads out some of the truck's equipment so we can take a look. At right, Hodgman gets into the truck cab and picks up the telephone of the Motorola two-way communications system.

(C. & E. M. Photos)

Heat-Treated Thickened Edges Add Strength to Plow Blades; Automatic Techniques Speed the Work and Cut Costs

• THE New Hampshire State Highway Department has won for itself national recognition by the efficient way it keeps its some 3,238 miles of paved roads free from ice and snow each winter. This is good business, for thereby the Granite State lures thousands of visitors to the winter-sports areas with the promise of roads that are not only open but also clean to the bare pavement. Skiers drive through New Hampshire during the winter months with the same feeling of security that they experience in the summer vacation season.

To remove snow and control ice is no easy task. It calls for a lot of hard work, long hours, good equipment, and last but not least, experienced personnel. The experience angle is important, and as a result of this know-how New Hampshire has developed a technique in plowing that is rough on the plow blades but produces the bare pavement that the traveling public has learned to expect.

In most quarters the usual practice in plowing snow is to lay the blade back at about a 45-degree angle, keeping the shoes at the bottom in contact with the surface being plowed. With this method, a thin covering of snow 2 to 3 inches deep may remain in certain areas after the road has been plowed. Naturally if this deposit remains to be compacted, a layer of ice is formed that is a hazard to safe driving. In New Hampshire the bottom shoes are removed so that the full weight of the plow is transmitted to the blade and thence to the surface, and the blade is also tilted forward in order to dig into the snow. This causes the sparks to fly as the plow blade scrapes the highway, but the pavement is left as bare as possible. Chlorides, mostly sodium, are spread over the traces of snow that remain, to prevent the formation of ice and keep the pavement bare and safe.

Strengthening the Blades

The steel blades of the plows can hardly be expected to last very long under this continual "contact" plowing. All plow blades are fabricated in the modern Concord shop of the New Hampshire State Highway Department from ½-inch-thick strips of 10-45 carbon steel cut in 6 and 8-inch widths according to the blades in use. The steel comes in 22-foot lengths, and is cut to varying sizes from 6 feet 8 inches to 10 feet. Blades may be either single or double-edge.

To strengthen the cutting edges of these blades and thus slow the feathering-out and wearing action, 2-inch strips of 10-45 carbon steel are welded to the blades. These strips are also ½ inch thick, thereby increasing the wearing surface to a full inch for either a single or double-edge blade. These thickened 2-inch-deep edges are hardened with heat treatment, producing a blade with a soft core but hard edges. Shocks are thus readily absorbed, and there is practically no breakage with a blade.

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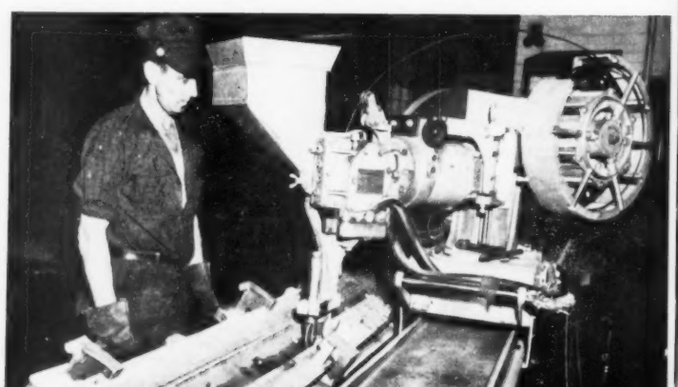
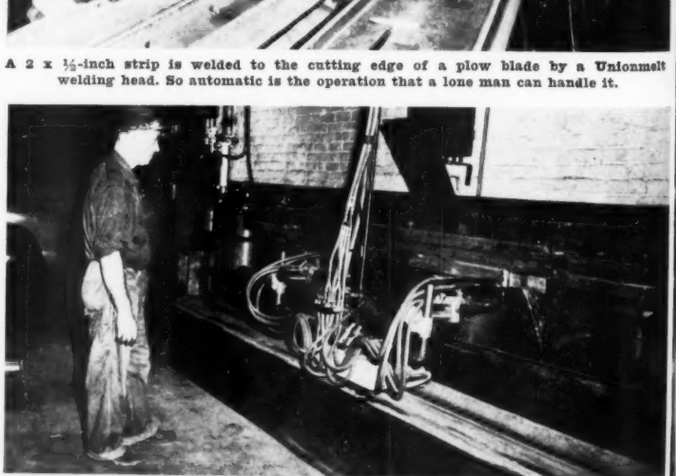


A 2 x ½-inch strip is welded to the cutting edge of a plow blade by a Unionmelt welding head. So automatic is the operation that a lone man can handle it.



In another part of the shop, the blade is heat-treated—again automatically. The Department devised its own machines for this work with the help of Linde engineers.

night weather patrol came to the assistance of 214 motorists.

As for the equipment employed in winter maintenance, trucks in service totaled 345 of which 52 were state-owned and the remaining 293 were hired. They ranged in size from 1½-ton up to 5-ton and over, with the greatest number falling into the 2 to 2½-ton group. Sand spreaders numbered 280, and 11 power graders were used. Of the 354 plows, 311 were one-way spinner plows; 28 were the reversible type; and 15 were V-type. In addition, 297 wing plows were attached to the trucks.

New Trucks, New Plows

In the eight maintenance divisions of the state there were 103 privately owned patrol trucks; the patrolmen were paid for the service of these trucks. The Highway Department plans to replace these private trucks with state-owned vehicles, and this past year has brought 48 new Chevrolet trucks as the initial step in this program. They are all 2-ton dump trucks equipped with two-speed rear ends. By using identical equipment, savings are expected from the interchange of parts, lower inventory costs, and speedier repairs.

As the trucks were delivered to the main garage in Concord, mechanics prepared them for their role in winter maintenance by installing a Frink 25SB one-way plow and a Frink 10BR wing plow. Each plow is 10 feet long, with the front plow being hydraulically operated by a National hydro-clutch pump, and the wing plow being manually operated. The latter is set at a fixed angle of 22 degrees with the side of the truck. This flat angle is possible with the fairly long wing plow, and it enables side thrust to be greatly reduced. A high-lift bracket was used with the wing so that the blade might be raised readily for knocking off the tops of tall snow banks.

No holes were cut into the fenders or hoods of the trucks in mounting the front plow. A heavy bracket was attached to the body frame beneath the radiator, replacing the front bumper. The bracket was bolted into place for easy dismantling. The hydraulic pump is under the hood, and the controls are handled from inside the driver's cab. In the summer when the plows are removed, the hydraulic lift may come in handy for raising objects, such as heavy rocks, in road maintenance; a 10-inch lift is possible with the snowplow equipment.

All blades that came with the plows were taken off to have their edges thickened and heat-treated for added strength. (See the accompanying article on opposite page.)

To Fit the Need

More shop work on the trucks included the addition of a 3/16-inch metal floor to the dump body to provide greater resistance to wear. The front end of the body, which is separated from the cab by a 12-inch opening, provided a convenient place for racking up the spare tire, an axe, shovel, crow bar, flares, etc. At the rear a bracket was installed for towing a sand spreader, and an angle iron to which a pull grader could be attached.

Prominent among the Highway Department's fleet of orange-colored trucks are three Chevrolet 3600 repair trucks. Two of these work out of the main shop in Concord, while the third is stationed in Littleton, 90 miles to the north, where the Department maintains a small shop to serve the mountain region. These trucks are equipped to do practically any kind of repair job in the field. They continually save time and money by shortening the "down" time of highway machinery at work, and eliminate hauling such units back to the shop for repairs.

Repair trucks are equipped with welding machines; a U. S. 1,000-watt electric generator for furnishing light and power for a powerful floodlight and electric hand tools; a ½-ton Cyclone hoist; a ¾-inch HD Skil Drill; a pipe cutter and threader; an adjustable die and screw-plate set; assorted tools; and grappling hooks. The latter are

(*Concluded on next page*)

New Hampshire State Highway Department Photos

The closeup at left shows the front-end mounting New Hampshire mechanics install on Chevrolet trucks for Frink 25SB one-way plow. At right, the truck is outfitted with its one-way plow and its Frink 10BR wing plow.

Shop-Work Prepares Trucks for Winter

(*Continued from preceding page*)

used when the truck crews are asked to assist the New Hampshire State Police in recovering drowned bodies.

Two-Way Radio

These repair trucks, along with certain automobiles, trucks, and fixed locations of the Highway Department, have been equipped with Motorola two-way radios in cooperation with the New Hampshire State Police. Contact from these units is with the Concord headquarters of the State Police and, within range, with the Highway Department's substation in Lancaster which serves the northern third of the state. Since these sets have an average range of 100 miles, the Lancaster station rebroadcasts calls that cannot be sent over the White Mountains from Concord.

Other state departments, including the State Police, Motor Vehicle, Fish and Game, as well as sheriffs and miscellaneous police officers, are hooked up with this two-way radio system. Each group is given a series number for identification. The present 40 units in the Highway Department are in the 400 series, with the Commissioner assigned No. 400. The final digit indicates the division assigned to a set, thus No. 401 is in the First Division of the Department.

Radios are assigned to department heads, division engineers, assistant division engineers, and supervising resident engineers. Some are used at fixed locations, where a particular job may be in progress. In such cases the antenna is inserted in the ground. Otherwise the usual whip antenna on motor vehicles is used. The sets operate on storage batteries. The dispatching stations operate on a 24-hour basis, and radios are turned on whenever a car equipped with a set is in use; sets are also on at all times when on duty at a station in a fixed location.

Installations were made primarily for efficient handling of emergencies, and to contact department employees who could not be reached by telephone. Routine business is also handled with greater efficiency, economy, and time saving. The two-way radio system is especially beneficial to the repair crews. To promote brevity and ease of handling, a signal code of the most used items is consulted when messages are transmitted.

Personnel

The New Hampshire State Department of Public Works and Highways is headed by Frank D. Merrill, Commissioner, with John O. Morton, Deputy Commissioner and Chief Engineer. Leroy F. Johnson is Maintenance Engineer, and Earl M. Sawyer is Equipment Engineer.

Data on Water-Repellent

A technical bulletin on Monoseal, a silicone-base liquid for making masonry walls water-repellent, is offered by The Monroe Co., Inc., Cleveland 6, Ohio. It lists general characteristics and applications of Monoseal, and contains specifications, directions for applying, and test data.

This literature may be obtained from the company by requesting Bulletin No. 126-11, or by using the Request Card at page 16. Circle No. 377.

Wheeler-Economy Merger

Two divisions of Hamilton-Thomas Corp., Hamilton, Ohio, have been consolidated—Economy Pump Division and C. H. Wheeler Mfg. Co., Philadelphia, Pa. Production, engineering, and sales departments of Economy have been moved from Hamilton, Ohio, to the Philadelphia plant; Economy pumps are now known as Wheeler-Economy pumps.

Some years ago Wheeler adopted the Economy mixed-flow pump for use with its condensers, and the two companies have since worked together principally in public utilities. The consolidation of C. H. Wheeler and Economy Pumps is resulting in a considerable expansion and modernization of the Philadelphia plant.

Highway Engr. Examination

The U. S. Civil Service Commission announces a Highway Engineer Trainee examination. Closing date for applications is February 5, 1952. Jobs to be filled by successful candidates will pay $3,175 and $3,410 a year.

The Highway Engineer Trainee program offers an opportunity to qualified persons to participate in special training programs in the Bureau of Public Roads and to become acquainted with the work of the Bureau. To qualify, all applicants must pass a written test. Applicants for jobs paying $3,175 a year must have completed three-fourths of the total number of credits required for the bachelor's degree in civil engineering; applicants for jobs paying $3,410 a year must (a) have completed a 4-year or longer professional civil engineering curriculum, or (b) have had 4 years of professional civil engineering experience, or (c) show a combination of such education and experience. Applications will be accepted from college students who expect to complete the required amount of study by September 30, 1952.

For further information and application forms write to the U. S. Civil Service Commission, Washington 25, D. C. Forms may also be obtained from most first and second-class post offices and from Civil Service regional offices.

Heat Treatment Used On Snow-Plow Blades

(*Continued from page 62*)

This method of conserving steel was adopted during World War II when material to replace worn-out snow-plow blades was difficult if not impossible to obtain. It was applicable to all kinds of plows—one-way spinner, reversible, or V-type. The 2-inch strips for welding on were often obtained by salvaging parts of old blades. But this process did require the services of skilled welders, and was rather time-consuming since each welding job was an individual hand operation. The saving on materials was lost to a certain extent by the amount of labor involved.

Automatic Welding

Accordingly the State Highway Department began devising a way to make these operations automatic so they wouldn't require the services of skilled welders. Jigs for holding the work were designed and built, and special machines for the welding and heat-treating were developed with the assistance of engineers from Linde Air Products Co. With this equipment it is possible for a single worker, without special skills, to place a blade in the jigs, weld the 2 x ½-inch strip to the cutting edge, and then run the strengthened blade through the heat-treating machine.

The completely automatic welding is done with a Unionmelt welding head using a submerged arc, and moving along the jig on which the blade rests at the rate of 22 inches per minute. With a reversible blade, as soon as one edge is done the blade is turned in the jig so that a strip may be welded to the other cutting edge. Uncoated welding wire is fed to the welding head from a reel at the side of the machine, which is electronically controlled throughout. The flux that is fed to the submerged arc from a hopper and tube hardens out, but it is reclaimed for reuse by putting it through a hammer mill.

The newly welded blade is then picked up by a Wright ¼-ton overhead hoist, rolling along a single track, and is moved to another part of the shop for heat treatment. The heat-treating machine also has two heads to speed production as it moves along in a jig holding the blade. This unit operates at about the same speed as the welding head, 22 inches per minute, and heats the steel to 1,300 degrees F. The heating heads are a trifle over 2 inches long to cover the cutting edge, and are followed immediately by the quenching spray, also on the automatic carriage. This heat treatment imparts to the 2-inch cutting edges a hardness of 550 Brinell. The channels of the jig supporting the blade are kept filled with water to absorb the intense heat that is generated.

Three Times the Wear

New Hampshire is now in its second year with the automatic welding and heat-treating operations, and the thickened-edge blades they produce give three times the wearing capacity of regular blades on the market. All the work is done by regular shop employees who require no special skills to handle the machines designed and built for this particular process.

About 300 tons of steel a year are fabricated into plow blades in the state shop. Material is ordered well ahead in order to insure delivery when needed. Thus in September, 1951, steel was ordered that will be used in the winter of 1952-1953. No great backlogs are piled up, however, and inventory is generally turned over every 12 months.

Besides the work on the new blades, the Unionmelt welding head is used considerably on salvage work. Thus several small pieces of old blades may be welded together to form an entirely satisfactory single blade. Holes for attaching to the plow moldboard are made in the blades with a Buffalo armor-plate-slitting shear punch and bar cutter. This powerful machine tool will shear ¾-inch plate, and punch 1 3/16-inch holes in ¾-inch plate.

Earl M. Sawyer, Equipment Engineer, directs the shop activities of the New Hampshire Highway Garage, a subdivision of the State Highway Department, which is headed by F. D. Merrill, Commissioner.

Harnischfeger Appoints

George W. Hoskins has been appointed Sales Manager of the Large Excavator Division of Harnischfeger Corp., Milwaukee, Wis., in succession to Paul H. Hunter, recently transferred to the P&H San Francisco branch. Mr. Hoskins joined Harnischfeger in 1937, and from 1945 until his present appointment served as District Manager of the Philadelphia office.

Flagmen Important To Road-Job Safety

The safety of men working on road construction or maintenance, together with that of the traffic using the highway, depends on the efficiency with which the flagman does his job. A leaflet of "Instructions to Flagmen" published by the Texas Highway Department, Austin, Texas, will be of interest to contractors and others concerned with the problem of traffic moving through road jobs.

The leaflet is a small pocket-sized one printed in red and black. It contains twelve simple rules for flagmen, amusingly illustrated, and explaining, for example, how far a flagman should stand from the workmen and the direction he should face so that he may see and be seen; how to make definite and understandable signals; how to stop a vehicle at night. It stresses the necessity of being both courteous and concise in explaining the reason for the stoppage; it tells how to slow traffic without stopping it; and it explains why it is important for the flagman to stay always at his post.

Bulletin on Admixtures For Prestressed Concrete

A bulletin on the use of Plastiment for prestressed concrete has been prepared by Sika Chemical Corp., 35 Gregory Ave., Passaic, N. J. It covers three essential topics: the characteristics required for prestressed concrete, the influence of Plastiment on the concrete in both its plastic and hardened stages, and suggested specifications for its use.

The company reports that the use of Plastiment will increase the workability, uniformity, strength, density, and bond of concrete used in prestressed construction. It is further said to reduce the water-cement ratio and provide a controlled set under changing temperatures or job conditions. The bulletin explains that the entire action of Plastiment is on the portland cement; it retards gel formations and disperses cement particles uniformly.

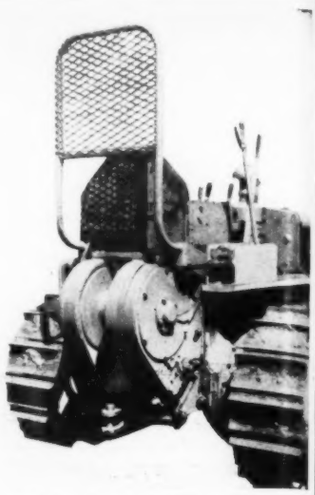
The company also offers two separate bulletins giving details on jobs where Plastiment has been used. One covers a prestressed-concrete warehouse floor; the other, a highway-bridge girder.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 326.

Miller Electric Appoints

Two changes in the sales organization of Miller Electric Mfg. Co., Appleton, Wis., are announced. C. Burnell Abel, formerly Sales Manager, is Vice President in Charge of Sales; and R. A. Metcalf, formerly Assistant Sales Manager, is Sales Manager.

Mr. Abel has been associated with selling in the welding industry for the past 17 years; and Mr. Metcalf has 14 years' experience in the same line.



Fast line speeds and free spooling are two features of the HySpeed winch for Caterpillar D4 tractors.

New Tractor Winch

A HySpeed winch which can be mounted on either the seat or fender tank of Caterpillar D4 tractors has been developed by Hyster Co., 2902 Clackamas St., Portland 3, Oreg. It can be used for lifting, pulling, crane work, light pile driving, and skidding logs, or bundled pulpwood.

Features claimed for the HySpeed are: free spooling to permit fast line pay-out to loads; a friction-driven clutch to give fast, positive line control; line speeds up to 515 fpm; a guard to insure safety of the operator; hydraulic controls which can be mounted to the left or right side of the operator for his convenience; and ample brakes giving positive control of the load.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 376.

Sectional Steel Shoring

A 4-page bulletin on Trouble Saver sectional steel shoring has been prepared by The Patent Scaffolding Co. Inc., 38-21 Twelfth St., Long Island City 1, N. Y. This shoring is made up of end frames, 5 feet wide and varying in height from 3 to 10 feet, and diagonal braces.

Here are some features of the system, as cited in the literature: it permits scientific job planning, takes little time to erect and dismantle, speeds pouring schedules, and eliminates waste material and fire hazards. The scaffold can be used for safe working loads up to 366 pounds per square foot, depending on the spacing between frames, type of frame used, and location of blocking timbers on the frames. The bulletin illustrates various applications of the shoring and cites testimonials of users.

This literature may be obtained from the company by requesting Bulletin No. PSS-28, or by using the Request Card at page 16. Circle No. 293.

All-Weather Road Material

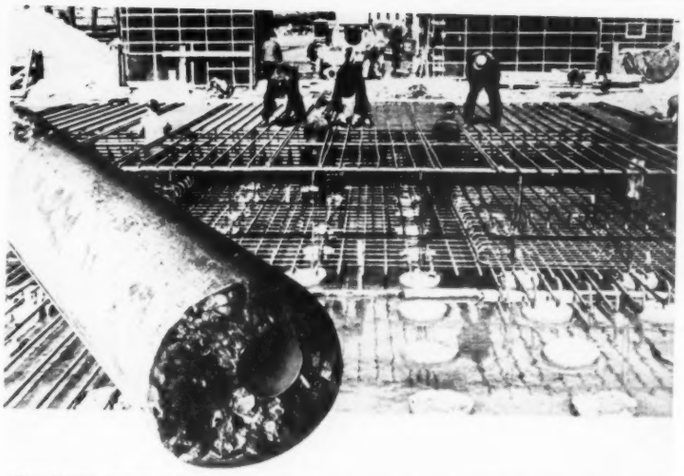
A brochure on Komac, a road premix for patching or paving which can be laid in any weather, has been prepared by Koppers Co., Inc., Koppers Bldg., Pittsburgh 19, Pa. This premix may be made up during slack periods and stockpiled near troublesome road spots. According to the booklet, it will not "stick" until compacted, it spreads easily, it has good adhesion, and it does not require heating or special mixing equipment. A portion of the booklet is devoted to case histories comparing performance of Komac premix and other patch mixes.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 363.

Pile Foundation Requires No Steel

A pile foundation was recently completed for the third and fourth sections of an extension to the Richard L. Hearn steam-electric generating plant in Toronto, Canada, the first plant of its kind in that city. Western Foundation Corp., New York, N. Y., installed the foundation, using its 20-inch-diameter Compressed Concrete uncased piles. Foundations of the two new sections and the first two—completed in 1950 and also installed by Western—together comprise 3,391 piles.

Western's Compressed Concrete pile requires no steel. The pile is formed as follows: The drive casing and close-fitting core are driven to the required depth. The core is removed and the casing filled with concrete. Then the core is placed on top of the fresh concrete and the casing pulled in such a manner as to prevent separation and assure a shaft of constant diameter, greater at all points than the diameter of the casing.



Foundation for an extension which Western Foundation Corp. installed at the Richard L. Hearn generating plant, Toronto, Canada. Closeup: a Compressed Concrete pile pulled after being formed against soil compacted by driving. Constant diameter and smooth surface are features.

In view of Canada's increasing need of electric power, the R. L. Hearn plant may need yet further expansion in the near future.

Welding and Cutting Tools

A 64-page four-color catalog on welding and cutting equipment has been prepared by Victor Equipment Co., Welding Equipment Division, 844 Folsom St., San Francisco 7, Calif. Illustrations and charts are designed to make selection and ordering easy.

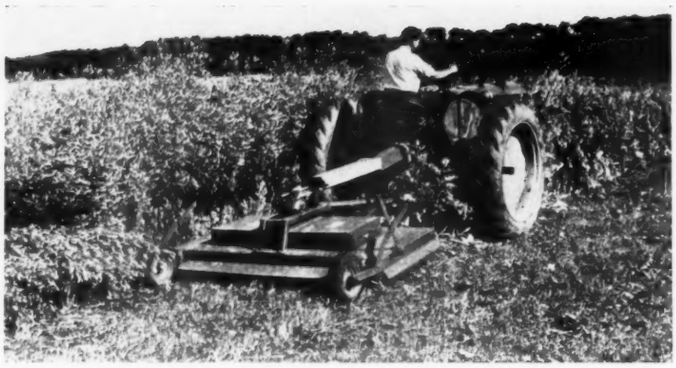
Among the many products presented are torches, regulators, safety valves, manifolds, nozzles, hose fittings, adaptors, gages, tips, and tip cleaners. Each unit is offered in a range of sizes and models to meet various welding and cutting needs. The catalog describes each and lists type numbers and sizes.

This literature may be obtained from the company by requesting Catalog 20-C, or by using the Request Card at page 16. Circle No. 330.

New Rotary Mower Cuts Roadside Brush

A rotary scythe mower that turns clippings into valuable mulch and thereby eliminates raking has been introduced by the Toro Mfg. Corp., 3042 Snelling Ave., Minneapolis 6, Minn. Whirlwind Twin 80 cuts a clean swath 6 feet 8 inches wide through heavy weeds and brush, shredding and scattering the clippings. It can mow right up to fences and along guardrails and overhanging bushes and shrubbery.

The Whirlwind Twin 80 can be adjusted to cut at heights from ground level to 14 inches. Its cutting blades slash their way through brush, stalks, vines, weeds, or grass. Shear bolts protect them from damage if a rock or other obstacle is struck. The blades may be sharpened with an ordinary file and renewed to complete cutting efficiency, according to the manufacturer.



Whirlwind Twin 80 rotary scythe mower turns clippings into mulch—eliminates raking.

The mower is of arc-welded one-piece construction. Interior formed channels are made of ¼-inch steel. The power requirement for the unit varies according to the material being cut, but a two-bottom tractor will handle all conditions, according to the manufacturer. All moving parts are completely shielded for safety and protection from moisture and dirt.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 294.

Desk-Type Console 2-Way Radio Station

A new console-type 2-way radio station is designed for fixed-station use in any 2-way radio communications system operating in the 30 to 50-mc frequency range. It is made by the RCA Victor Division of Radio Corp. of America, Camden, N. J.

The desk-type Fleetfone Model CSF-60A combines a 60-watt transmitter-receiver and its power supply in one cabinet. It has provisions for remote control, optional 2 or 3-channel transmitter operation, dual-channel receiver operation, and use of local or remote-type speakers. It may be mounted against a wall if desired, since both the transmitter-receiver and the power supply are in an upright position and can easily be removed for servicing through the top of the cabinet, the company says. It can also be shelf, desk, or floor-mounted.

The receiver is said to have high selectivity, with nearly flat response over the desired modulation range of plus or minus 15 kc of the desired signal. It has maximum rejection of undesired adjacent-channel signals, RCA claims. The frequency of the Fleetfone station transmitter is controlled by an RCA ovenless crystal unit. The transmitter chassis can accommodate two additional crystals and crystal-tuning capacitors to permit 3-frequency operation. The circuits are designed around tube types easily obtainable; a pair of 807 tubes, for instance, are used in the final power amplifier stage. The power supply unit is said to be ruggedly constructed and rated for continuous duty. No forced-air cooling is needed. Circuits are all fused for added protection of the equipment. Two toggle-switch controls are provided: one for the main ac line, the other to switch between transmitter and receiver operations.

The Fleetfone station console is $11\frac{7}{8}$ inches high, $22\frac{3}{4}$ inches wide, and $20\frac{3}{4}$ inches deep over-all. The sloping front panel of the desk unit has a built-in direct-reading electric clock and all the controls required to operate both transmitter and receiver.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 385.

Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief extracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Reimbursed for Compulsory Overtime on Government Job

THE PROBLEMS: *After the terms of a housing construction job had been agreed upon, but before a contract had been signed, an Executive order was issued fixing a 48-hour week for all Government projects. The contractor was urged to sign and did so, relying upon instructions that had been given to regional directors to reimburse contractors for extra costs caused by the order.*

(1) Did this amount to an agreement by the Government that, if the contractor complied with conditions imposed, he would receive an allowance to cover the increased cost of compulsory Saturday work, not foreseen when the contract price was agreed upon? (2) If so, in computing the additional allowance, should there be taken into account the contractor's saving in job overhead and machinery rental as a result of accelerated completion of the job? (3) Should the allowance be reduced on an assumption that the subcontractors' overhead costs were diminished by the accelerated completion?

THE ANSWERS: (1) Yes. (2) Yes. (3) No. (John A. Johnson Contracting Corp. v. United States, 98 Fed. Supp. 154, decided by the United States Court of Claims.)

1. The court noted that the contractor could have refused to sign the contract because it did not take into account the effect of the intervening work-week order. He had a right to assume that provisions for filing reimbursement claims were an agreement by the Government that such claims would be allowed on compliance with conditions prescribed by the Government, and that he need not depend "merely upon the will of an official".

2. The court said that it was only just that the contractor should credit against his additional wage bill savings accruing from the hastening of completion that resulted from a compulsory 48-hour week, instead of the 40 hours contemplated when the contract price was fixed. The court credited the Government not only with the contractor's saving in job overhead and machinery rental, but also with a proportion of his home-office overhead. It was recognized that it is impossible to apportion precisely home-office overhead among the numerous jobs of a contractor. The cost must come out of all of the jobs, and no better method was conceivable than to make a percentage apportionment.

3. A reduction on account of the subcontractors' overhead saving was disallowed on the ground that they probably added enough in their prices to cover overhead. The contractor having paid the subs, no deduction should be made against the contractor.

Dredging Co. Was Liable To Abutter for Land Damage

THE PROBLEMS: *The War Department permitted a holding company to dredge a creek adjacent to plaintiff's island. A dredging company, acting for the holding company, negligently caused a slide into the creek from plaintiff's land. (1) The dredging having ceased, was plaintiff entitled to an injunction against further dredging? (2) Were the holding and dredging companies jointly liable for the damage done to plaintiff's land? (3) If so, was the holding company entitled to reimbursement against the dredging company?*

THE ANSWERS: (1) No. (2) and (3) Yes. (Sea Harbor Corp. v. G. & M. Dredging Co., 105 N. Y. Supp. 2d 497.)

1. There was no need for injunction against the dredging company because no further dredging by it was contemplated. As to the War Department, the Court was powerless to restrict future dredging by it or its permittees.

2. The companies were jointly liable for the damage done because the work ordered was inherently dangerous as to plaintiff's land, and plaintiff was entitled to resulting damage, even though the work was permitted by the War Department.

3. The holding company was entitled

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Trailmobile Branch Managers

Trailmobile, Inc., Cincinnati, Ohio, announces changes in the management of the company's Youngstown, Ohio, and Buffalo, N. Y., branches. Harold M. Green, formerly Manager of the Youngstown branch, is now Manager at Buffalo; and Wallace F. Thompson succeeds him at Youngstown.

Mr. Green joined Trailmobile in 1947 and has served as Branch Manager at Toledo, Akron, and Youngstown. Mr. Thompson has been a salesman for the last four years at the company's Central Division at Syracuse, N. Y.

Avoid Legal Pitfalls

(Continued from preceding page)

to reimbursement against the dredging company, because the latter was the actively negligent party and had agreed to indemnify the holding company against liability.

Contractor Not Liable For Faulty Specifications

THE PROBLEM: *A paving contractor had not warranted against defects. Was he liable for the cost of repairs necessitated by insufficiency of the base or subgrade provided by the owner, or by failure of the plans and specifications to provide for sufficient drainage?*

THE ANSWER: No. (Woods v. Amulco Products, 235 Pac. 2d 273, decided by the Oklahoma Supreme Court.)

The court noted that in "practically every" state where the question has come up it has been judicially decided as follows: no contractor, who has followed plans and specifications furnished him, who has not been negligent in doing his work, and who has not guaranteed that the plans were sufficient, is liable for loss or damage resulting from defects in those documents—"at least after the work has been completed."

(Comment: But it does not necessarily follow that a contractor who proceeds with work, knowing that the plans and specifications furnished him are defective, can escape liability. If he would guard himself against litigation which he might lose, he had better draw the owner's attention to the defects, and insist upon a clause in his contract disclaiming responsibility for loss or damage that may result from following the plans and spex.)

Employee Cannot Collect If Negligent of Own Safety

THE PROBLEM: *An injured employee is often entitled to sue a third party for injury sustained during his employment, instead of seeking an award against the employer under a workmen's compensation law. In such cases, the third party's liability may depend upon whether he was at fault and also upon whether the injured man failed to use proper care for his own safety.*

A general contractor's foreman suffered an injury to his hand when he grasped a cross brace on an operating concrete mixer in order to climb upon the mixer, instead of using a steel ladder provided for that purpose. Was the foreman guilty of negligence that prevented his collecting damages from the subcontractor?

THE ANSWER: Yes. (Billeter v. Rhodes & Jamieson, 231 Pac. 2d 93, decided by the California District Court of Appeal, First District.)

The court said, in effect: the situation on a construction job may be such that an employee of one contractor is an "invitee" of another contractor, as distinguished from an intermeddler or trespasser. So, if the subcontractor in charge of the mixer had asked the foreman to remove certain bearings from the mixer, the sub would have been liable for any negligence resulting in the foreman's in-

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Avoid Legal Pitfalls

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jury. But, even though so invited, the foreman could not collect damages for injury resulting from his own clear fault in placing his hand on the cross brace, which was close to a clearly visible steel fin on the outside of the revolving drum of the mixer.

No Right to Interest On Disputed Accounts

THE PROBLEM: *In an accounting between a prime contractor and a subcontractor under a construction contract, where various items claimed by each party were disputed, did a court have a right to award interest on those items in settling the accounts?*

THE ANSWER: No. (Dawson, Corbett & Shelp v. Lieurance & Canfield Construction Co., 235 Pac. 2d 457, decided by the Wyoming Supreme Court.)

The decision follows a well established rule of law that in awarding a judgment on an unliquidated debt, interest runs only from the date of judgment.

Repaid for Compensation

THE PROBLEM: *The Louisiana workmen's compensation law, like statutes in other states, provides that where an employer has been required to pay an award through carelessness of a third party, he can hold the latter liable for reimbursement for any amount which he has paid or become obligated to pay as compensation. The law also provides that a compensation award shall include medical, surgical, and hospital service, etc., not exceeding $500. Where the employer has paid more than $500 for such expenses, can he hold the third party liable for the entire expenditure?*

THE ANSWER: Not under the compensation act. But, apart from that law, the employer can succeed to the rights of the injured employee and thereby compel the third party to reimburse him for the extra medical expense. (De Roode v. Jahnke Service, Inc., 52 So. 2d 736, decided by the Louisiana Court of Appeals, New Orleans.)

Profit Share Plus Interest

THE PROBLEM: *As a general rule, one partner or joint venturer is not entitled to sue the other for a share of profits until there has been a complete accounting of the financial affairs of the partnership or venture.*

Plaintiff furnished money needed to perform a single construction contract. He and defendant, his partner, had an agreement for division of the profits; the money had been earned and was in defendant's hands. Did the foregoing rule prevent plaintiff from suing defendant for his share of the profits?

THE ANSWER: No. (Morris v. Redak, 234 Pac. 2d 908, decided by the Colorado Supreme Court.)

The court decided that defendant was liable to plaintiff not only for the latter's share of the profits, but also for interest on the same from the date when the share should have been turned over to plaintiff.

Engineer's "Satisfaction"

THE PROBLEM: *Assuming that a construction contract requires the work to be done to the "satisfaction" of the owner's engineer, is it essential for the engineer's certificate of performance to state in so many words that he is satisfied?*

THE ANSWER: No. (Jose Naples, Inc., v. Great Notch Development Co., 149 Atl. 33, decided by the New Jersey Supreme Court, 1930.)

The court regarded it as "captious criticism" to say that the certificate must recite performance to the engineer's satisfaction. The engineer's certificate that the work has been performed according to contract implies that it has been done to his satisfaction, and his satisfaction is that of the owner, his employer.

Belt-Conveyor Idlers With Prelubrication

Improved prelubricated belt-conveyor idlers are manufactured by Transall Inc., 109 N. 11th St., Birmingham 4, Ala. They are said to require no future lubrication, since the contact-sealed high-speed heavy-duty ball bearings and special mounting features work together to exclude foreign material and retain bearing lubricant. This eliminates the cost of lubrication, reduces fire hazard from grease collection, and prevents grease injury to the belt and grease contamination of the product handled.

The sealed-in lubricant is designed to operate with no appreciable change in viscosity—from —90 to 200 degrees F—giving a practically constant idler friction factor throughout this temperature range. It melts at 376 degrees F and is inhibited against oxidation, emulsification, and saponification. The result, according to the company, is an idler which may be almost universally applied regardless of operating temperatures.

Idler frame construction is all-steel and jig-welded to give uniform belt training under all loading conditions. Roll shafts are solid, extend completely through the idler roll, and are mounted to eliminate all cantilever loading on the roll ends. The low friction factor reduces conveyor horsepower requirements and permits the use of small-diameter idler rolls without sacrifice of idler life or conveyor dependability, the manufacturer claims.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 366.

The GS safety goggles give wide-angle vision and a snug comfortable fit. They are made of lightweight plastic.

Data on AC Volt-Ammeter

A 16-page manual entitled "Servicing With the Amprobe" is available from Pyramid Instrument Corp., 49 Howard St., New York 13, N. Y. The Amprobe is a pocket-size alternating-current ammeter and voltmeter.

The manual contains histories of cases in which the Amprobe saved time and effort in locating trouble, and prevented the shutting down of operating equipment. Clever cartoons illustrate each experience. It also includes a working drawing of the Amprobe with its specifications and mechanical dimensions; a list of uses; and instructions for reading the unit.

This literature may be obtained from the company by requesting Manual No. 504, or by using the Request Card at page 16. Circle No. 277.

New Safety Goggles

Plastic lightweight safety goggles for use against flying particles, sparks, splashes, spot welding, chips, dust, and glare are available from General Scientific Equipment Co., 2700 W. Huntingdon St., Philadelphia 32, Pa. They are said to afford wide-angle vision and may be worn over prescription glasses. They are of one-piece construction with a molded-rubber binding to fit the natural contours of the face. The elastic headband insures a snug fit and all-day wearing comfort, the company says. The goggles are available in styles GS No. 100 clear and GS No. 200 green.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 372.

X-Ray Diffraction For Concrete Studies

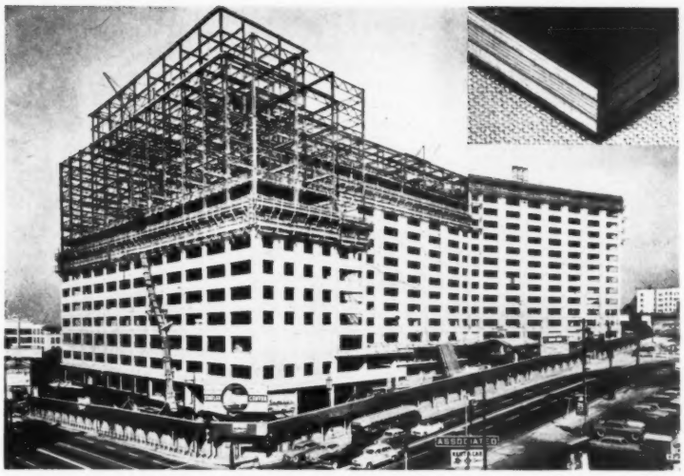
The Waterways Experiment Station of the Army Corps of Engineers is using X-ray diffraction, the "electronic detective" of research, to seek better concrete at lower cost. The study is being undertaken for the Office of the Chief of Engineers, with particular emphasis on the quality and cost of concrete used in the Civil Works Program.

Studies by other agencies have indicated that X-ray diffraction can be a powerful tool in identifying, classifying, and understanding the properties of materials used in concrete construction. The new model XRD-3, developed by the X-Ray Department of the General Electric Co., 4855 Electric Ave., Milwaukee 14, Wis., is being used for this work. It is designed either for making photographic records of X-ray diffraction patterns or for the direct recording of diffracted ray intensities on a strip chart. The installation at the Waterways Experiment Station includes all the facilities needed to prepare photographic records.

One valuable characteristic of the apparatus is the fact that very small samples weighing only a few hundredthousandths of an ounce are used to obtain the diffraction data. This permits testers to select for study tiny portions of very fine-grained materials such as admixtures for concrete, cements, hydrated cements, and clays. Some of these materials cannot be satisfactorily studied and identified by microscopic or chemical methods.

Duke Chair of Engineering

Duke University, Durham, N. C., has received $126,000 with which to found a chair of learning and scholarship in its College of Engineering. The endowment—to be known as The Jones Chair of Engineering—has been created in honor of the late J. A. Jones of Charlotte, N. C., who founded the J. A. Jones Construction Co. in 1894, and also in memory of his son, the late Raymond A. Jones. Income from the fund will be used to pay all or part of the salary of the Dean of the College of Engineering and to give substantial scholarship assistance to worthy and qualified students in the College. Donors of the gift are members of the Jones family and the J. A. Jones Construction Co.



During construction of the Statler Hotel in Los Angeles, Contractor Robert E. McKee experimented with sheets of Plyron, new plywood-hardboard combination form panel (see inset). He reported 11 re-uses from the panels. Concrete surfaces obtained compared favorably with those formed against plywood.

New Re-Usable Panel For Concrete Forms

A re-usable concrete-form panel called Plyron, which combines a backbone of plywood with surfaces of hardboard, has had successful trial use on the New Jersey Turnpike and several other big construction jobs, according to the Douglas Fir Plywood Association, Tacoma Bldg., Tacoma 2, Wash. It is now being produced commercially by some plywood firms and experimentally by others.

Plyron is said to capitalize on the best features of two major forest products. Hardboard, which is made by compressing wood fibers into a thin hard sheet of uniform density and smoothness, gives the product a tough, wear-resistant outer surface; plywood inner construction provides a strong, dimensionally stable core. The combination is split-proof and relatively light in weight, according to the Association, and it is permanently bonded with the same moisture-resistant glues used in Plyform, the concrete-form grade of Douglas fir plywood.

Rigid standards of manufacture have been established for the combination material, the Association states, to assure a strong, durable bond of all plies in the panel. Similarly, only hardboards of tested quality are applied as surfaces, and at present the Masonite Corp. of Chicago is the primary supplier of these sheets.

Further information and the names of companies producing Plyron may be obtained from the Douglas Fir Plywood Association. Or use the Request Card at page 16. Circle No. 280.

Weight Slide Rule

An improved model of the Wake weight rule, designed to calculat quickly and accurately the weight various sizes and sha of metal, ha been announced by Warren-Knigh Co., 136 N. 12th St., Philadelphia 7, P The rule enables the user to determin the weight of any size or shape of lea copper, brass, stee., cast iron, alum num, or magnesium. Its usefulness h been increased by including on the reverse side a new arrangement of standard slide-rule scales.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 314.

New Bechtel Office in NYC

Bechtel Corp. and Bechtel International Corp., together with their affiliate, Geo. S. Colley, Jr., & Associates, construction and engineering firms headquartered in San Francisco, Calif., have leased the 19th floor of the new Chrysler Bldg. East, 405 Lexington Ave., New York 17, N. Y. Bechtel and Bechtel International will maintain their San Francisco headquarters and permanent offices in Los Angeles, Washington (D. C.), and New York; but Geo. S. Colley, Jr., & Associates will have its main offices at the Chrysler Bldg. East. Both firms plan to move into the new building early this year.

Chrysler Bldg. East is a new 32-story air-conditioned building for which Turner Construction Co. was the general contractor.

Citizens Can Help Good-Road Programs

Sound Laws, Adequate Finances, and Honest Administration Are the Goals; They Can Be Reached, With Public Backing

• THERE are 48½ million users of motor vehicles in America, all of whom want and need good roads. But do they want them enough to do something about it? C. Coykendall, Executive Secretary of the Iowa Good Roads Association, in a paper at the 37th Annual Purdue Road School, expressed the opinion that it is only by the active cooperation of all interested citizens that the nation will achieve a system of highways, secondary roads, and city streets commensurate with its vital needs both in peace and war.

It is difficult to understand why there is such apathy in high Government places among those at present responsible for motor-vehicle transportation. If they are not convinced that good roads are essential to the national economy and to the mobilization program, Mr. Coykendall said, perhaps it is because no one person or agency can speak with authority for this $40-billion-a-year business. It must be because good salesmanship for road-improvement programs is lacking. It is high time, he holds, that individuals and groups of individuals found a way to back up the recommendations of public highway officials, whose pleas meet with so little response.

Deficiencies Are Real

As a reminder that deficiencies in our streets and roads *do* exist, Mr. Coykendall cited the results of widely publicized surveys made in recent years across the nation by state and Federal highway officials. The figures speak for themselves: at the time of the surveys, $11,000,000,000 would have to be spent to correct deficiencies in the interstate system alone, while for the entire mileage of streets and roads, the figure quoted was $41,000,000,000. For a realistic appraisal of today's needs, it would be necessary to add from 15 to 25 per cent to these figures. Not only have these estimates never been seriously questioned or challenged, but public highway officials have found themselves so often rebuffed in the past that, in the opinion of many road users, the funds they are now seeking allow for less elaborate construction than is actually needed for an efficient road system.

Present Urgency

Moreover, the survey figures were based on peacetime needs. What must those needs be today, when the nation is geared to wartime production and

(*Continued on next page*)

every available road should be in good condition for the transport of freight and passengers? Even rail, air, and water transportation arteries are helpless without adequate roads to and from their fixed terminals. Hitler did not win the last war, in spite of his famous modern highway system, but it played a valuable part in enabling him to carry on for two years after Germany's rail transportation had been demoralized by enemy bombing.

Production — the nation's greatest strength—would not amount to much if the goods produced could not be transported to their destinations. Mr. Coykendall quoted a prominent railway official on the subject of the motor truck in today's transportation. "If every truck in America stopped at sundown tonight," he said, "every railroad in America would be paralyzed at sundown tomorrow night. Incoming freight couldn't reach our terminals, nor could we unload freight that had reached its destination." Add to this the fact that motor trucks are making inroads on railroad transportation in the matter of long-haul freight movements of merchandise, and it follows that if we are to expand and strengthen our productive capacity, we must expand and strengthen motor-vehicle transportation—and that means an accelerated program of highway construction.

Why Don't We Get the Roads?

Before going into the question of why public highway officials have been unable to impress their needs on officials, Mr. Coykendall made himself quite clear on two points. (1) Adequate roads cost less than poor ones. We can afford them —and in any case it is too late to say now that motor transportation is beyond our means; it has become part of our standard of living. (2) There is no sales resistance to overcome in the motorist; he knows he wants good roads, and he wants them now. If we can persuade him we have a fair plan for financing a good-roads program, he will support it. Why, then, does he not get his roads?

Mr. Coykendall summed up the reasons briefly, as follows:

1. There is no dominant voice among the spokesmen for motor-vehicle transportation. Varied groups and associations with a vital interest in motor-vehicle transportation have never been able to agree on a program that *all* would support. In consequence, the conflicting aims of small pressure groups have only succeeded in confusing the legislators, so that they achieve nothing adequate.

2. While there is complete agreement on the need for better highways, there is no agreement whatever on how they should be financed. It should be possible to work out a widely acceptable plan for distributing their cost fairly.

3. Public highway officials are hampered in their efforts to press their road-financing plans by the following factors: (a) the short-sighted and often unscrupulous opposition of certain groups who do not wish to pay for facilities which benefit them; (b) an unbusinesslike reluctance to use public funds for financing effective publicity; (c) a lack of salesmanship in the executive engineering heads of public highway departments, whose reports are technical, full of figures, and make dull reading for the layman; (d) many of our top highway officials are growing old and, retirement programs being meager, they are naturally not anxious to offend their political superiors and end their careers before they have to; (e) in many cases the political superiors of highway officials are less likely to consider the public interest than their own careers; (f) in too many instances politics play such an obvious part in development programs, and construction projects are so often used for paying political debts, that public confidence is alienated.

What the Citizen Can Do

And so we come back to the 48½

(Continued on next page, col. 3)

Bulk-Cement Transporter

Literature on the Bulker, a trailer body for transporting and unloading bulk cement and other pulverized materials, has been prepared by Schuch Bros. Machine Co., P. O. Box 3911, Detroit 27, Mich. This unit consists basically of the tank with a motorized unloading system; two screws run along the bottom of the W-shape body. It is available in three sizes to hold 90, 100, and 110 barrels of cement.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 353.

Citizens Can Help Good-Road Programs

(*Continued from preceding page*)

million motorists who are still waiting for their good roads. Mr. Coykendall took the state he knows best—Iowa—as an example of what can be done, and explained how in that state, and in several other states, nonprofit, nonpolitical organizations have been formed for the sole purpose of promoting sound road programs. While each state must of necessity have its own particular problems, certain objectives are common to all, and therefore to all good-roads associations. These are: sound laws; adequate financial support; and honest, competent, nonpolitical administration.

Sound Laws

The responsibility for roads is fixed differently in different states. It is important, Mr. Coykendall believes, that this responsibility should be in the hands of a unit which is large enough for efficient experienced direction and use of modern power equipment, and yet not too large and centralized. Mr. Coykendall's considered opinion is that, for most states, the county is probably the most efficient and logical unit of government for administering the secondary-road program. There is enough work to be done and enough money involved to warrant the full-time employment of a competent engineer to give leadership and direction. In Iowa, the success of the secondary-road program in each of the 99 counties has been largely dependent on the quality of leadership given by the county engineer.

As to laws governing procedure, there is little uniformity in this matter in the laws of the 48 states. The most important point to remember is that such laws should be critically reviewed from time to time to meet changing conditions.

Finances

Distribution of costs in an equitable manner is vital for the success of any road plan. Naturally, no formula would be acceptable to everybody, but it should be possible to come to some better arrangement than at present. In the different states there are such wide variations that they cannot all be fair and sound, and in some cases the only criterion seems to be what the traffic will bear at the time the law is enacted. Any plan for distributing road costs must be based on the revenue accruing from the following sources: road-use taxes; real-estate taxes; and Federal Aid.

Road-use taxes include motor-vehicle registration fees; motor-vehicle fuel taxes; fees or compensation taxes for operating commercial vehicles over fixed routes for hire; and any other special state or Federal taxes levied on motor-vehicle transportation. Vehicle owners paying these taxes are entitled to expect adequate roads, and until these are provided, said Mr. Coykendall, it is obviously unfair to divert the revenue from such taxes to any purpose other than that of financing road programs.

As the intake from road-use taxes is not enough to pay for maintenance and improvement of residential streets and light-traffic roads, such earnings should be supplemented by property

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taxes or special assessments, according to Mr. Coykendall.

As for Federal aid, he holds that the Government's tax policy for motor-vehicle transportation is out of all proportion to the gains received by the road-using public. It is a widely accepted principle in individual states that all special taxes levied on motor-vehicle transportation should be used for financing roads. But this is a principle not adhered to by the Federal government, which collects $3.00 or more from the American motorist for every dollar it returns in building roads. Such programs as the construction of a limited network of main highways to serve interstate commerce and national defense are proper fields of interest for the Federal government, but Federal taxes on motor-vehicle transportation should be restricted to amounts required for Federal participation in construction costs.

Administration

If we complain about the quality of administration of our road programs, we should reflect that it is we who elect our administrators, or the officials who appoint them. Considering the fact that we are niggardly in the compensation paid to those holding high positions in highway administration and engineering, we ought to congratulate ourselves that so many men of ability and character have chosen to devote their lives to the public service in this sphere. The highest-paid executive officer in highway administration probably draws substantially less than does the lowest-paid executive of any motor-vehicle, tire, or oil company.

Good-Roads Associations

In summing up his suggestions as to how the citizen can help himself to better roads, Mr. Coykendall recommended the formation of a Good Roads Association in each state. He did not commit himself to specific rules for the organization of such bodies, but told how Iowa's association, sponsored by the State Association of Chambers of Commerce, came into being, and mentioned that its program is largely educational in that it seeks to get and keep Iowans fully conversant with the problems incidental to building and maintaining an adequate highway system.

Mr. Coykendall did, however, enumerate certain principles which he believes fundamental to any effective organizations devoted to citizens' cooperation in road-improvement programs. These are:

1. The organization must be wholly free from suspicion of having any selfish purposes to serve.
2. All systems of public thoroughfares must be of equal interest to it.
3. The organization should accept members only on the understanding that it cannot sponsor particular types of construction or projects. Any groups having a direct financial interest in road programs may be accepted on this understanding, but should not have a vote in determining the policy of the organization.
4. The organization cannot act as a cheer-leader for any group of public officials. It must be equally free to commend and to criticize.
5. It must function in such a manner that it is accepted by all as a reliable and unbiased source of accurate information on matters pertaining to roads.

A National Association

Finally, Mr. Coykendall gave it as his opinion that, if every state had an active citizens' organization, a *national association of such organizations* might be helpful to the road program of the nation. It could dispel the apathy in high places. It could speak with authority and relieve the confusion in legislators' minds. And it would have at its back an informed public, and a vocal one. Isn't it about time, Mr. Coykendall asked, that we American motorists, who use the roads and pay the taxes, make a critical re-examination of our whole road system?

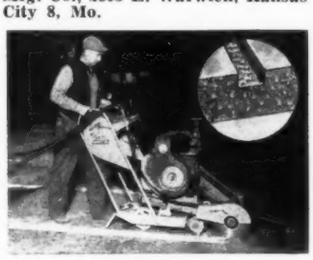
"It is the duty of every man to protect himself and those associated with him from accidents which may result in injury or death", is one of the sayings of Abraham Lincoln.

Welding saved 170,000 pounds of steel for the framework of the 14-story Broadview Apartment Building in Baltimore, Md., according to Vulcan Raid & Construction Co., fabricator and erector. All welding for this project was done with Lincoln machines and electrodes.

CONSTRUCTION EQUIPMENT NEWS

A Preview of Equipment That Will Help You On the Job

PATCHES—TRENCHES SAWED FOR FLOOR—STREET REPAIR —Saw concrete floors, walks or streets! Saw narrow slit trenches 1" wide for conduit or any width for utility lines. Eliminate jackhammer fractures beyond the straight, smooth sawed lines.—**Write Clipper Mfg. Co., 2803 E. Warwick, Kansas City 8, Mo.**

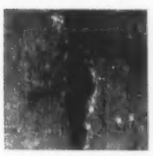


FLOORS, DRIVES, RUNWAYS EASILY CUT FOR REPAIRS—Rail tunnels, rail and pipe trenches, air lines and machinery bases were cut in dense concrete with a Model C-130 Clipper Concrete Saw and CDS-20 Diamond Blade at the rate of 5' per minute—3" deep. Tremendous savings were claimed by the contractor in removal and replacement.—**Write Clipper Mfg. Co., 2803 E. Warwick, Kansas City 8, Mo.**

TRACK SAW NOW CUTS LARGEST STONE, TRANSITE, TERRA COTTA — By placing C-15 Clipper Concrete Saw on tracks, a Cleveland contractor cut limestone veneer units from 15'x7"x15" quarry lengths. In addition to large, bulky shapes this model is efficient and dustless for inside patch and trench work.—**Write Clipper Mfg. Co., 2803 E. Warwick, Kansas City 8, Mo.**

CONTRACTION JOINTS NOW SAWED—Floors, walks, drives and runways now poured continuously (reduces bulkheading!) Then joints are sawed to eliminate hand forming and costly spalling.—**Clipper Mfg. Co., 2803 E. Warwick, Kansas City 8, Mo.**

STUDIES OF SAWED JOINTS PROVE VIRTUAL ELIMINATION OF SPALLING — Highway transverse joints sawed 2" deep are devoid of spalling after 1½ years in contrast to heavy spalling in a few weeks on formed joints, according to State tests.



Typical spalling after few weeks heavy traffic.

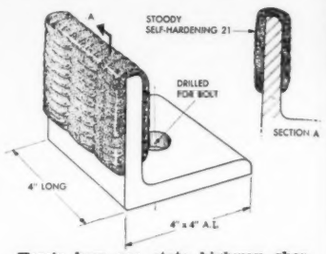
Sawed joints on same highway after 1½ years.

Announces F-A Allotment For State Highways, 1952

The Federal Highway Act, approved on September 7, 1950, authorizes $500,000,000 as Federal Aid to the states for highways in the fiscal year beginning July 1, 1952. The funds have been apportioned and will be available for expenditure until June 30, 1955. Apportionment provides $225,000,000 for projects on the Federal-Aid highway system; $150,000,000 for the Federal-Aid secondary system; and $125,000,000 for the Federal-Aid highway system in urban areas.

The Bureau of Public Roads will supervise the spending of the funds, in accordance with the procedure in use for many years, in which state highway departments propose projects, prepare plans, award contracts, and supervise construction, all subject to Federal approval. Federal participation is limited to half the cost except in the public-lands states, where participation may be increased above 50 per cent by one-half of the percentage of the area of the state that is public land.

Federal-Aid highway funds are divided in proportion to area, population, and mileage of post roads, each being given equal weight. In the case of Federal Aid for secondary roads, funds are apportioned in the same manner, except that rural population is used rather than total population. For urban projects, funds are divided in proportion to population in municipalities and other urban places of 5,000 or more.



Here's how one state highway shop hardfaces bolt-on paddles for its asphalt-paving spreaders.

Hard-Facing Reduces Repair of Equipment

Contractors and state highway men faced with the need for frequent replacement of the rotor assemblies on asphalt-paving spreaders may be interested in the following story taken from "Fusion Facts", a quarterly publication of the Stoody Co., Whittier, Calif.

One state highway department found that the agitator bar and bolt-on paddles of its spreader wore rapidly from the abrasive action of the aggregate. Moreover, cleaning them to get at the bolts for removal was a time-consuming and unpleasant job. Accordingly the department tried hard-facing the agitator bar and paddles with Stoody Self-Hardening 21 in an attempt to cut maintenance costs on the unit. It had been necessary to replace the untreated blades every three months or so, but the hard-faced assembly has been in service for two years and is still in excellent shape. When the blades do wear, they are restored to original size and efficiency by adding a little additional hard metal.

The bolt-on blades are made of 4 x 4-inch angle iron cut in 4-inch lengths and drilled for the bolts. Considerable time is spent in fabricating these pieces. The center bar to which the blades or paddles are attached is a 12-foot length of 4-inch-square stock. This part, too, is protected by hard-facing the wearing areas. The blades are hard-faced on both their front and back sides and on their outer edges before they are put into service.

The highway maintenance shop where this application originated has, as a result of its tests with Stoody hard-facing alloys, developed a regular preventive-maintenance program in which hard metals play an important part.

Oil and Gas-Oil Burners

A 4-page bulletin presenting Hev-E gas and combination oil and gas burners for commercial and industrial use has been issued by Cleaver-Brooks Co., 326 E. Keefe Ave., Milwaukee 12, Wis. It describes five models, the AMG 2, 3, 4, 5, and 7. It contains illustrations, instructions for operation, and a chart of ratings and capacities. It highlights the units' forced-air draft system and electronic controls.

The burners furnish 100 per cent of all the air for combustion; the gas and oil can be burned completely without induced secondary air. Both the Hev-E gas and combination gas and oil burners use any type of gas—natural, mixed, or manufactured. The combination unit also burns low-cost No. 5 fuel. According to the bulletin, simple changeover makes it possible to switch combination burners from gas to oil or oil to gas in a few minutes.

This literature may be obtained from the company by requesting Form AD-101, or by using the Request Card at page 16. Circle No. 336.

Beder for Whitney Chain

Harold W. Beder, Jr., has become General Sales Manager of Whitney Chain Co., Hartford, Conn. He was formerly associated with McKinsey Co., Management Consultants, New York, and has had many years' experience in market research and merchandising.

Hot-Mix Carpet Coat Seals County Roads

Asphaltic Plant-Mix Coat Replaces Conventional Oil and Chip Cover and Gives Better Riding Surface

By HAROLD SPRENGER, Orange County, Calif., Road Commissioner

• IN a day when unheard-of refinements are being perfected in electronics and nuclear physics, it seems strange that no engineer has yet found a foolproof answer to a simple problem like highway maintenance. Heavier traffic loads, denser volumes, too-light construction in the past—they all continue to give maintenance engineers ulcers and force the emphasis onto the preservation and renovation of something that is old.

In Orange County, Calif., we have 1,000 miles of county-maintained highways within an 800-square-mile land area. Traffic is heavy, because the county is both a metropolitan area and a bridge between Los Angeles and San Diego Counties. Lately, added complications in the form of buzzing defense bases have cropped up. It takes a good highway to accommodate a marine returning to El Toro after a 3-day leave.

Money is seldom available for the changes we would like to bring about in types of construction. Our annual highway budget is approximately $1,200,000, and we have to make it go as far as possible, even though traffic is brutally modern and a large percentage of the highways are of the road-mix oil type. We find that the annual maintenance costs on these low-type roads are more than three times those on the plant-mix asphaltic-concrete type.

Hot-Mix Seal Developed

One of the most critical of maintenance operations, especially on lower-type construction, is routine surface sealing. If the seal is placed so as to be water-repellent, subgrade saturation can be prevented. If the seal also combines structural properties to increase the strength of the mat, so much the better.

Because of the urgent need of an economical method of extending the life and reducing the annual maintenance costs of oiled roads, we in Orange County have made extensive studies of a new type of sealing. And in many places—everywhere we can, in fact—we have chosen the new plant-mix carpet-coat seal against the old bituminous-binder and stone-chip method.

Binder Method Too Variable

No road maintenance operation requires better judgment based on practical experience than the binder method of sealing. Different sections of the same road may, under California conditions, vary as to soil structure or composition, moisture content, and existing pavement conditions. Temperatures may vary within limited areas; so may the texture and absorbent qualities of the roadway surface to be rehabilitated. Where bituminous binder and stone chips are used, these items themselves may vary, too, as to specific gravity or absorbent qualities.

These variables are not easy for the average organization to measure. To write formulas and specifications for the binder method is difficult, and a certain amount of experimentation is unavoidable. Unless the foreman in charge is capable and experienced, the chances are that a satisfactory job will not be obtained.

For example, an excess of oil will cause bleeding or rolling and destroy the nonskid surface of the stone chips. There must be an excess of rock even under ideal conditions, with a resulting waste of material and money. If the oil film is not thick enough—rising to between 50 and 70 per cent of the average thickness of the stone chips—the rock will naturally whip off more rapidly, and the application will deteriorate faster.

To obtain the best results, traffic should stay off this type of seal until the oil has had sufficient time to set up. This is an added disadvantage compared to the plant-mix application, which can be opened to traffic as soon as it is completed.

Advantages of Hot-Mix Method

The hot-mix carpet coat, on the other hand, is a simple operation which is virtually mistake-proof. It does not call for the same precise formulation, quite such careful application, or such experienced personnel. It does not call

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Harold Sprenger (right), Orange County, Calif., Road Commissioner, talks things over with his District Superintendent, Beverly Seeley.

Hot-Mix Carpet Coat Seals County Roads

(Continued from preceding page)

for the same careful judgment, except as to whether sealing should or should not be done. When the hot-mix carpet coat is used, we in Orange County feel that the chances of getting an unsatisfactory job are remote.

Because of its longer life, it would seem reasonable to assume that the denser plant-mix application retards oxidation and wear. Although its original cost is higher, its longer-lasting qualities reduce its annual cost, making it cheaper over a period of years.

We have analyzed comparative costs and the figures are interesting. We find that a mile of surface 18 feet wide can be sealed with plant-mix compressed to a thickness of ⅜ inch for approximately $950. Oil binder and chips over a like area will cost about $600.

Quantities involved in this theoretical mile of plant-mix seal call for approximately 700 gallons of HX-emulsion tack coat, and 285 tons of SC-4 plant-mix. Average unit prices in Orange County are 10 cents per gallon for HX and $2.75 per ton for plant-mix. Thus, there is a cost difference in favor of the binder method of about $350 per mile.

What maintenance engineers frequently overlook is that this cost differential will be substantially reduced if much patching or surface preparation is necessary. The plant-mix application will take care of holes and depressions, while these will frequently have to be built up by preliminary patching when the oil and rock method is used.

The review of a large number of sealing jobs under identical conditions shows—to our satisfaction, at least—that the plant-mix carpet coat outlasts the other type of cover by about 2 to 1. On the basis of its longer life, the annual cost of the plant-mix is definitely lower.

Conditions Should Be Right

Plant-mix sealing may well set the stage for all-around maintenance economy. But it should be done only under the right conditions, and only after careful, competent visual inspection. Orange County does from 30 to 40 miles of this type of sealing each year. We find that the treatment is especially good where the old roads traverse gravelly, sandy, or silty-soil formations. It is not so suitable where subgrades are of clay or other plastic soils. In the latter case, we have no hesitation about using oil binder and chips instead.

Let's take a look in the field, now, and visit a typical carpet-coat job a few miles outside the county-seat limits at Santa Ana. The inspection has been made to determine that the subgrade and surface condition warrants the expense of a sealing operation. Material has been ordered, traffic barricades and flagmen are on the job at 8 a. m., and everything is all set to go for the 0.7-mile improvement.

On this job we used Stancal HX emulsion, which was hauled to the job by truck and applied by an Etnyre pressure distributor. The rate of application was 0.1 gallon per square yard—hardly more than a fog coat. The tacked surface was opened for traffic immediately after the emulsion was applied, but most of the local traffic used side streets and roads during the morning while the work was in progress.

Trucks carrying from 7 to 8 tons of plant-mix then came in to the job from a commercial hot plant in Santiago Canyon. Three such plants are located in the county, and fierce competition favors the buyer of material. The asphaltic-concrete mix consisted of 1,300 pounds of No. 4-minus mineral aggregate; 2,500 pounds of Santa Ana River sand; and 165 pounds of SC-4 asphalt. The trucks delivered the material to the job at a temperature of approximately 265 degrees.

As is usual in this procedure, a fast initial spreading pass was made to barely cover the tack coat of emulsion. In the first application of hot-mix, a truckload often went several hundred feet. When the tack asphalt was covered, enough material was added to make a final coating of about 6 pounds per square foot. It was spread and bladed by a No. 12 Caterpillar motor grader, the aim being to get the material smoothed as quickly as possible with the least amount of segregation. Edging blocks were used on the motor-grader blade to finish the seal-coat edges to a smooth, straight line.

Rolling was done in this case by truck tires, with special effort to make sure the entire surface area was thoroughly covered. We often use an 8-ton Buffalo-Springfield steel-wheel tandem roller, but the truck tires also do a satisfactory job. This road was turned back to traffic immediately, and within a few weeks the carpet coat was dense, durable, and smooth.

The costs on this project were:

Labor:	
Spreading plant-mix	$39.78
Spreading HX emulsion	9.71
Rolling	7.86
Traffic control	13.89
Subtotal	71.24
Material:	
SC-4 plant-mix, 138.5 tons @ $2.30	434.71
Bitumuls HX, 450 gallons @ .10	45.00
Total	$550.95

It might be noted that this job intersected a heavily traveled state highway, and that the cost for traffic control as a result is not necessarily typical of most county jobs in the back areas.

Catalog on Weigh Batchers

Literature describing a complete line of modern batching plants designed for manual, semiautomatic, or fully automatic proportioning is offered by Noble Co., 1860 Seventh St., Oakland 20, Calif. Each of three types of controls is described in detail. Special features are highlighted with photos and drawings.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 300.

Traffic Survey by Post Card

The Highway Research Board's Bulletin No. 41 reports on the method of making traffic origin and destination surveys by post cards. This procedure supplies adequate data for most highway and street-planning needs and produces a much larger sample than the home-interview method in a minimum of time at a low cost. Its use, however, is limited to those states where vehicle-registration data can be segregated by political subdivisions or where business-machine card records can make such selection.

The bulletin comprises reports on surveys in three states—Ohio, where the method was pioneered, West Virginia, and New York. F. J. Murray, Chief Engineer of the Ohio Highway Planning Survey, describes the Ohio procedure; C. A. Rothrock, Planning Engineer of the State Road Commission of West Virginia, sums up results in that state; and Maynard A. Bebee, Senior Engineer of the Bureau of Highway Planning, New York State Department of Public Works, discusses urban arterial-route surveys in New York State.

The three reports compare costs involved in this type of study and indicate the reliability of the results obtained. Diagrams and sketch maps illustrate the reports, and the bulletin contains sample post-card forms, tables, IBM statistical cards, and study sheets used in analyzing the survey data.

HRB Bulletin No. 41, "Traffic Surveys by Post Cards", may be obtained from the Highway Research Board, 2101 Constitution Ave., Washington 25, D. C. The price is 60 cents.

Cooke for Union Wire Rope

Robert K. Cooke has been appointed factory representative for Union Wire Rope Corp., Kansas City, Mo., with headquarters in Pittsburgh, Pa. Mr. Cooke has for several months past been taking Union Wire Rope's comprehensive factory and field-sales training course. His sales territory will comprise Pittsburgh, Butler, Warren, Bradford, Erie, Steubenville, and Latrobe, Pa.; Wheeling, W. Va.; and New Waterford, Ohio.

Convention Calendar

January 15-18—HRB Meeting
Annual Meeting, Highway Research Board, National Academy of Science Bldg., Washington, D. C. Fred Burggraf, Director, 2101 Constitution Ave., Washington 25, D. C.

January 21-24—ARBA Meeting
Annual Meeting, American Road Builders' Association, Rice Hotel, Houston, Texas. Lt. Gen. Eugene Reybold, Executive Vice President, International Bldg., Washington 4, D. C.

January 27-31—AED Meeting
Annual Meeting, Associated Equipment Distributors, Conrad Hilton Hotel (formerly Stevens), Chicago, Ill. P. D. Hermann, Executive Secretary, 360 N. Michigan Ave., Chicago 1, Ill.

January 28-29—Landscape Architects Meeting
Annual Meeting, American Society of Landscape Architects, The Warwick Hotel, Philadelphia, Pa. Bradford Williams, Corresponding Secretary, 9 Park St., Boston 8, Mass.

January 28-30—Asphalt-Paving Meeting
Annual Meeting, Association of Asphalt Paving Technologists, Hotel Netherland Plaza, Cincinnati, Ohio. Ward K. Parr, Secretary-Treasurer, Box 376, Ann Arbor, Mich.

February 10-14—National Sand & Gravel and National Ready Mixed Concrete Associations
Annual Conventions, National Sand & Gravel Association and National Ready Mixed Concrete Association, Conrad Hilton Hotel (formerly Stevens), Chicago, Ill. V. P. Ahearn, Executive Secretary, 1325 E. St., N. W., Washington 4, D. C.

February 19-21—Illinois Highway Conference
Annual Conference on Highway Engineering, University of Illinois, Urbana, Ill. W. S. Pollard, Jr., Dept. of Civil Engineering, University of Illinois, Urbana, Ill.

February 25-28—AGC Meeting
Annual Convention, Associated General Contractors of America, Statler Hotel, Detroit, Mich. H. E. Foreman, Managing Director, Munsey Bldg., Washington 4, D. C.

February 26-28—ACI Convention
Annual Convention, American Concrete Institute, Netherland Plaza, Cincinnati, Ohio. American Concrete Institute, 18263 W. McNichols Road, Detroit 19, Mich.

March 3-5—Utah Highway Conference
Highway Engineering Conference and Road Show, University of Utah, Salt Lake City, Utah. A. Diefendorf, Head, Dept. of Civil Engineering, University of Utah, Salt Lake City 1, Utah.

March 3-7—ASCE Convention
New Orleans Convention, American Society of Civil Engineers, St. Charles Hotel, New Orleans, La. Don P. Reynolds, Assistant Secretary, 33 W. 39th St., New York 18, N. Y.

March 3-7—ASTM Meeting
Spring Meeting and Committee Week, American Society for Testing Materials, Hotel Statler, Cleveland, Ohio. C. L. Warwick, Executive Secretary, 1916 Race St., Philadelphia 3, Pa.

March 4-7—AHONAS Convention
Annual Convention, Association of Highway Officials of North Atlantic States, Hotel Traymore, Atlantic City, N. J. A. Lee Grover, Secretary-Treasurer, State Highway Department, 1035 Parkway Ave., Trenton, N. J.

March 19-21—N. Y. Highway Engineers
Annual Convention, New York State Association of Highway Engineers, Hotel New Yorker, New York, N. Y. Convention Secretary, Harry Spitzer, Box 38, State Office Bldg., Babylon, Long Island, N. Y.

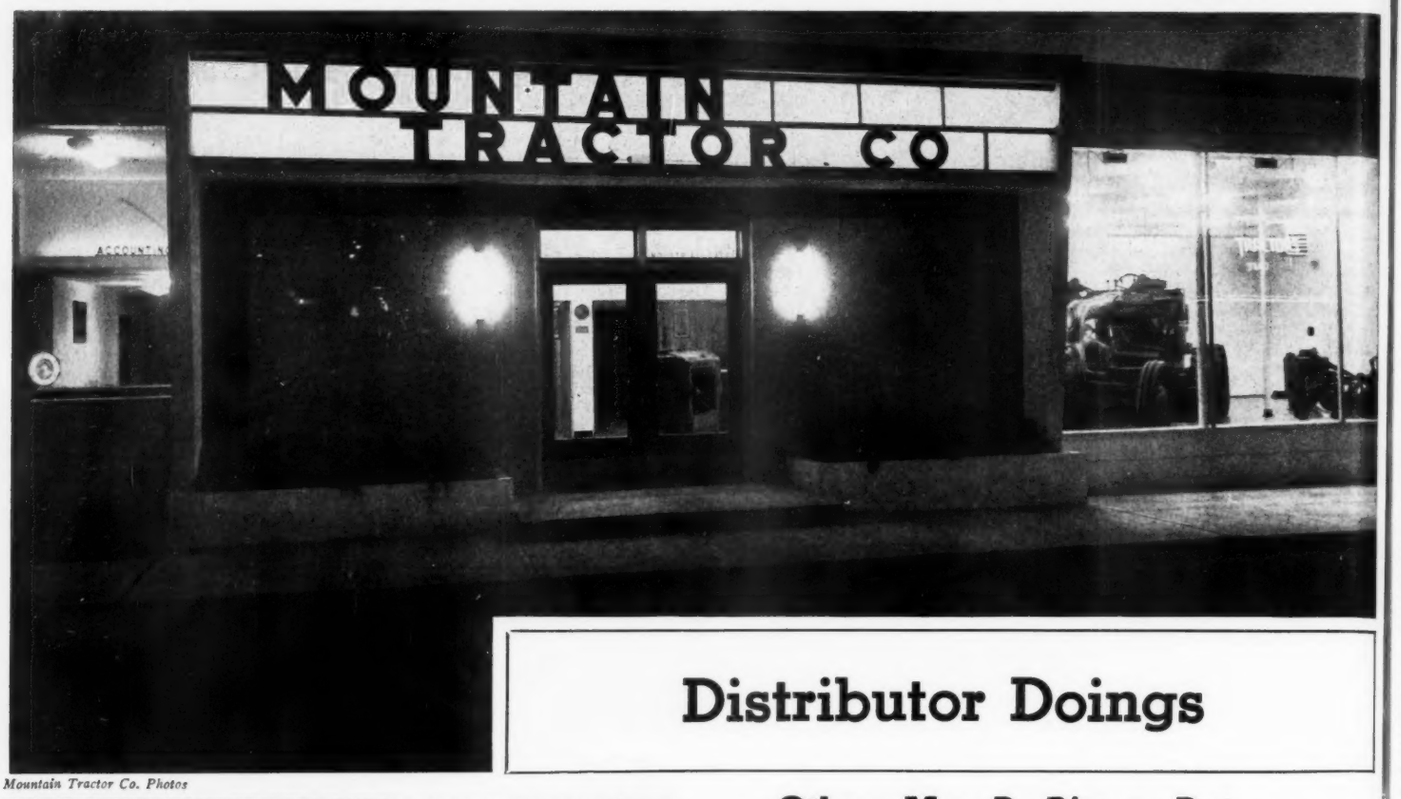
April 1-4—New York Safety Meeting
Annual Convention, Greater New York Safety Council, Hotels Statler and New Yorker, New York, N. Y. Paul F. Stricker, Executive Vice President, 60 E. 42nd St., New York 17, N. Y.

April 7-9—Lubrication Meeting
Annual Meeting and Lubrication Show, American Society of Lubrication Engineers, Hotel Statler, Cleveland, Ohio. W. F. Leonard, Secretary, 343 S. Dearborn St., Chicago 4, Ill.

April 14-17—Purdue Road School
Annual Road School, Purdue University, Lafayette, Ind. Prof. Ben H. Petty, School of Civil Engineering, Purdue University, Lafayette, Ind.

Kennametal, Inc., Appoints

Appointments recently announced by Kennametal, Inc., Latrobe, Pa., include Kenneth Trombley, Sales Representative in the new Tennessee and Alabama district; Frank Price, Engineer and Representative in the Middle-Atlantic district; and Lindsay Bros., agents covering the western Oregon area.



Distributor Doings

Mountain Tractor Co. Photos

Perhaps what makes Mountain Tractor Co. tick so well is the fact that President V. R. Howell and his partners are all active in the everyday work of the firm.

Others May Be Bigger, But . . . .

By RAY DAY

• "OTHERS may be bigger, but they don't give better service."

That statement by V. R. Howell, President of Mountain Tractor Co. of Missoula, Mont., is part of the service policy of the company. But the same idea has been expressed by contractors in the territory, and by manufacturers' representatives traveling through.

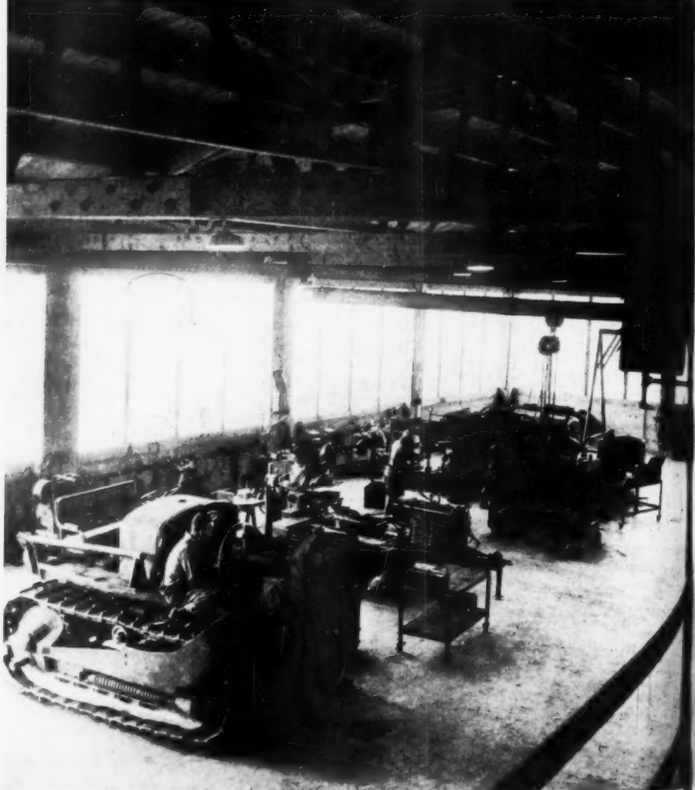
The service policy is no mere abstraction, either. It is something that's hard to lose sight of in such an organization as this one, in which the main partners are all active workmen in company business. Howell, the President, is also General Manager in charge of sales. George Martin, Vice President, is the active manager of the Kalispell, Mont., branch of the outfit. J. E. Manning, Secretary-Treasurer, is the active office manager. All are stockholders; all carry on the routine business of the company every day.

As a result, Mountain Tractor Co. is perhaps as typical as any equipment house in the country of the type of distributorship which serves an enormous segment of the construction business. True, Mountain Tractor Co. also has an agricultural service and sales business, but many a big contractor in the 11

(Continued on next page)

Customers, too, get right into the swing as soon as they enter the building, for they must pass through this showroom filled with equipment to transact their business.

At the parts counter service is fast and the customer's wait is short.



Heart of the "service" policy is this well equipped main shop.

western Montana counties operates equipment sold by the Missoula concern. The annual gross business volume is typical of most moderate-sized firms of this type.

But what is perhaps unusual about the firm is the general setup so far as organization, headquarters building, and service equipment are concerned. Missoula headquarters are set up so efficiently that service has to be good.

The main building, 125 feet wide and 90 feet deep from the street, is a special monolithic reinforced-concrete structure designed so that 30-ton loads can roll around on the main shop floor with no danger whatever to the basement underneath. Direct and indirect fluorescent lighting fixtures adorn the place. The building is divided into administrative offices, a parts room, a main service shop, a showroom, and a fireproof vault. There are 43-foot driveways at each side of the building, and plenty of acreage in the tract behind for the storage of equipment, or for future expansion. In fact, this extra space forms a part of the service "extras" for contractors. Any contractor passing through Missoula can use this yard free of charge. He can also store small equipment inside the building.

The present building was designed and constructed under Howell's supervision, and so thoroughly were all the "bugs" whipped at the outset that nothing would be changed if the job had to be done over today. Every customer entering the building has, first of all, ample parking space out front. Every customer has to come through the display or showroom to transact his business. Howell's office, along with the credit manager's, is in the center of the floor and not off to one side. A parts counter is handy for the customer. Bookkeeping is such that parts can be delivered rapidly, through a shipping-receiving room adjacent to a small loading ramp outside. During the short wait, the customer can look around at new equipment on display. The showroom floor is big enough to hold a large-sized motor grader, a tractor, and a small shovel at one time.

Every possible item of service equipment that a well staffed shop could have is on hand. There is even a dustproof, airtight room for servicing and testing fuel injectors and pumps. The main shop has a complete line of heavy-duty tools and much special equipment including a handy setup for crane service. A 10-ton Wright hoist is mounted on a monorail which tracks along one end on a beam at the side of the building. The other end is mounted on a wheeled A-frame, giving enormous flexibility of access to any part of the shop.

Cleaning is done both by steam and by chemical vats, also accessible to a small hoist. Chemical cleaning is particularly effective for engine parts.

Storage of fast-moving parts is provided for on the main service floor, where steel bins are located. Slower-moving parts, such as agricultural items which come up only once a year, are stored in the basement. "Men aren't stumbling around over them the balance of the year", Howell explained.

Mountain Tractor Co. Photo

A customer "extra" is this ample tract behind the building, which any contractor passing through Missoula can use free of charge.

Many Lines Carried

The company carries many well known lines of equipment. It is one of the few Allis-Chalmers dealerships which has a dual contract in both the agricultural and industrial market. AC's full line of companion equipment

(Continued on next page)

Distributor Doings

(Continued from preceding page)

—Baker, Carco, Gar Wood, and Kay Brunner—are also carried. General Motors diesel engines and power units are featured. Thew-Lorain shovels and draglines are a big account.

The Bros line of heating and rolling equipment is also a part of the company business, along with Corley and Corinth power sawmills. Roebling wire rope is carried, and accessories of almost any description for logging and farming industries can be found here.

Serves 11 Counties

The Missoula headquarters and the Kalispell branch serves the 11 western counties in Montana. It is a rugged territory, embracing mountains, farmlands, and plains. There are 9 service men available each day in that territory, and the six panel and pickup service trucks of the firm are familiar sights to the highways which crisscross the territory. Service men are unusually efficient in their territories, because they always call in at the completion of every job to see if there is anything else in their immediate area which needs their attention.

There are 3 parts men at Missoula; 2 at Kalispell. Each week one man is appointed for night and week-end duty, to take care of any emergency calls from customers in the region. In spite of shortages and a wartime atmosphere in the national production setup, Mountain Tractor Co. has managed so far to keep parts in supply for the equipment it sells.

In fact, it might be easy to editorialize on something which happened recently in regard to parts, and which illustrates better than anything else why customers are happy with service from this alert firm.

A few months ago, a General Motors representative called. His firm, he explained, had made an analysis of the more than 100 GM stationary engine setups credited to Mountain Tractor Co. sales efforts, and the survey had shown that Howell's firm was far below other dealerships in the nation in parts business for this installed equipment. What was happening? Was Howell buying his parts from somebody else besides the parent company?

Howell grinned, and before he explained, pointed out that he wasn't crazy—he'd certainly not buy from somebody else and lose his GM discount. Then he explained that Mountain Tractor Co., when it sells a stationary power unit, insists on engineering the entire connection, power drive, horsepower rating, and all. No underpowered installations are made. No installations are made where the engine has to lug down and run at less than 1,600 rpm. When stationary power installations are put in right, Howell explained, not many parts fail and have to be replaced. Service, he explained further, is more than selling parts.

Multiply that incident by the number of good, alert, ethical dealers all over the nation and you have explained why there are so many satisfied equipment users in the country.

Howell and his partners are all "old men" to the equipment business. Howell started back in 1920, when he took a job with Connelly Machinery Co. in Billings. He stayed with the firm nearly a quarter of a century, rose to sales manager, and finally was made branch manager of the Great Falls headquarters. In 1944 he purchased the Missoula firm in his own right, and final business arrangements were incorporated in 1945.

The firm has prospered ever since, and probably will continue to do so with an active service policy and an active set of working partners.

AED 1952 Annual Meeting

The 33rd Annual Meeting of the Associated Equipment Distributors will be held at The Conrad Hilton Hotel (formerly Stevens Hotel), Chicago, from the 27th to the 31st of this month.

Top speakers from Government and industry are scheduled to speak—among them, Rear Admiral Ellis M. Zacharias, USN retired, author of "Secret Mission" and "Behind Closed Doors", who will be the featured speaker at the Farewell Luncheon. A sales-executive clinic will be conducted by the well known business economists Millard Bennett and John D. Corrigan. Other sessions on the program are "Meet Your Manufacturers", a government-problems meeting, and a manufacturer-distributor-problems meeting. Two afternoons have been left open for manufacturer-distributor contacts.

Social affairs include the traditional Early Birds Breakfast on Monday, January 28; the President's Cocktail Party the same evening; the AED Annual Banquet on Tuesday evening; the Installation of Officers Luncheon on Wednesday; and the Farewell Luncheon on Thursday.

Chairman of the 1952 Convention Committee is S. F. Laskey of Northwestern Equipment Co., Fargo, N. Dak.

Brown Holds 4-Day Open House

The new Cedar Rapids branch of the Herman M. Brown Co., Des Moines, Iowa, held open house from October 17 through 20 in its $250,000 building

(Continued on next page)

A four-day open house was held recently at Herman M. Brown Co.'s new branch in Cedar Rapids (top photo). In the lower photo, members of the firm appear, left to right: Ben B. Brown, General Manager; M. D. Burns, Sales Manager; Herman M. Brown, President; C. E. Tanberg, Supervisor of Sales, Cedar Rapids Branch; and Donald J. Brown, who is Branch Manager at Cedar Rapids.

A good old-fashioned weight-guessing contest opened Herman M. Brown Co.'s open house at Cedar Rapids. George Specht, of Anamosa, Iowa, came within 4 pounds of the correct weight, 3,845 pounds. Four people tied for second place.

at the junction of U. S. 30 and Iowa 149. Over 1,000 guests attended, and Brown employees ran personally conducted tours through the 15,000-square-foot plant. Of special interest were the modern shop facilities, conveniently arranged for rebuilding all types of construction equipment. There is a special laboratory for testing and calibrating diesel injection pumps, and complete fuel-system service is available.

The party got off to a good start with a weight-guessing competition. Each person attending was asked to guess the weight of a large stone furnished by the L. Crawford Lime & Quarry Co. Guesses ranging from 475 to 8,500 pounds were proffered, but the stone actually turned the scale at 3,845 pounds, so the nearest guess—3,841 pounds—hit the jackpot. The lucky man was George Specht, Jones County Auditor from Anamosa, Iowa, whose prize was a Philco combination radio, phonograph, and television set. Four people who tied for second place each received a Mall drill kit.

During the four days of the open house, luncheon was served from 10 a. m. till 2 p. m. On the last evening 60 manufacturers' representatives were dinner guests at the Montrose Hotel; the next day they were taken to the Iowa-Michigan football game.

(*Continued on next page*)

Distributor Doings

(Continued from preceding page)

Donald J. Brown, son of the founder, is Manager of the Cedar Rapids plant; C. E. Tanberg is Supervisor of Sales; Curt Smith is Service Manager; and Bill Huggins, Parts Manager.

The building was designed by Henry A. Fisk of Iowa City, and the contractor was O. F. Paulson Co. of Cedar Rapids.

Eighmy Represents Nordberg

Eighmy Equipment Co., Pierpont at W. State St., Rockford, Ill., is a new distributor for Nordberg 4FS diesel engines in the northwestern and central sections of Illinois. The firm, which was established in 1940, already represents six manufacturing companies in the area. Nordberg 4FS diesels are four-cycle heavy-duty vertical engines designed for stationary or portable power applications and marine uses.

Armstrong Equipment Co.'s service plane is a Cessna 140 and can carry 80 pounds of spare parts as well as two passengers. It is equipped with a radio-phone.

Distributor Uses Radio-Phone And Plane for Speedy Service

A two-place airplane and a service truck, each equipped with radio-telephone, play an important part in the service given by Armstrong Equipment Co. The company, General Motors diesel-engine distributor for Birmingham, Ala., realized that fast service was essential in this area where diesels are relied upon for vital power supply, and it came up with the right answer. The plane, a Cessna 140, can carry 80 pounds of spare parts besides two passengers; the truck carries a complete set of hand tools as well as a good stock of spare parts, enough to give an engine a minor overhaul in the field.

Armstrong cites many instances where important operations have been maintained in spite of minor interruptions and near-disasters. One example is that of a contractor 131 miles away from Birmingham who reported a minor engine difficulty which was holding up his work. The plane took off, he met it at a nearby airport, and was back at work 2 hours after calling for service. In another case a cotton ginner 140 miles away called and said he was "down" and needed a serviceman quickly as it was the busy season. He was back in operation within 1½ hours. There have been several occasions when the radio-phone has caught the truck in the vicinity of a call. The home office contacts the truck immediately and saves the owner valuable time and extra mileage.

Termite Appoints Two Dealers

Termite Drills, Inc., Pasadena, Calif., has appointed two distributors for its concrete and core drills. In all states west of the Mississippi River, the firm will be represented by Clark & Sawyer, Inc., Los Angeles, Calif.; and in all territory east of the Mississippi, by Specialty Co., Inc., Lakeville, Conn. John H. McIntyre, El Monte, Calif., will handle Termite's export sales.

Herd Branch at Woodward, Okla.

Herd Equipment Co., Oklahoma City, recently opened a new branch at Woodward, Okla., to serve customers in the northwestern part of the state. Located at 1124 W. Main, Woodward, the modern building is just across the street from the M.K.&T. passenger station. In addition to a complete line of all the equipment sold by Herd, the branch stocks parts and accessories.

Jack Myracle, Herd's Service Manager, is supervising the new store at present, and his assistant is Vernon Blagg.

B-E Names Alabama Dealers

Bucyrus-Erie Co., South Milwaukee, Wis., has appointed two new distributors in Alabama: Ray-Brooks Machinery Co., Inc., Montgomery; and Tractor & Equipment Co., Inc., Birmingham. They will handle the company's excavators, Hydrocranes, and Hydrohoes, as well as its Bullgraders, bulldozers, Dozer-Shovels, and scrap-

(Continued on next page)

Distributor Doings

(Continued from preceding page)

ers designed for use with International crawler tractors.

Tractor & Equipment Co. serves the northern half of Alabama. Ray-Brooks Machinery Co., with branches in Mobile and Pensacola, serves the southern half of Alabama and that part of Florida west of the Apalachicola River. The territories are divided at the northern boundary lines of the counties of Sumter, Greene, Hale, Perry, Chilton, Coosa, Tallapoosa, and Chambers.

Six More Dealers for Cleco

The Cleco Division of the Reed Roller Bit Co., Houston, Texas, announces the appointment of six more dealers who will handle in their respective areas the Cleco and Dallett lines of air tools and accessories: The W. S. Ehrenfeld Co., 531 W. King St., York, Pa.; Hillsman Equipment Co., Melrose Park, Ill.; R. W. Hudgins & Sons, 1-3 Commerce St., Norfolk, Va.; Cherokee Tool & Supply Co., Jacksonville, Texas; Portable Tool Engineering Co., Detroit, Mich.; and Universal Shellac & Supply Co., 425 Morgan Ave., Brooklyn, N. Y.

Waco in Milwaukee and Hawaii

Wilson-Albrecht Co., Inc., Minneapolis, Minn., has given the exclusive distribution rights for Waco sectional steel scaffolding to Waco Scaffolding, 7824 W. North Ave., Milwaukee, Wis. This company maintains warehouse facilities at 2617 W. Rogers St., Milwaukee. A further franchise for Waco goes to the Home Welding Co., Ltd., 1014 S. Queen St., Honolulu, Hawaii, which will have exclusive rights in the Hawaiian and Lime Islands.

Both the Milwaukee and Honolulu firms will handle the complete Wilson-Albrecht line of scaffolding, mason and scaffold jacks, material-hoisting towers, and portable elevators.

Missouri-Illinois Ups Roland

Earl Roland is now Sales Manager of the Missouri-Illinois Tractor & Equipment Co., St. Louis, Quincy, and Charleston, Mo. Mr. Roland has been with the company for seven years, serving as a sales representative in the northern Missouri territory, with headquarters at Moberly.

Missouri-Illinois, which celebrated its tenth anniversary last year, handles distribution in eastern Missouri and southern Illinois for Adams, Bucyrus-Erie, CMC, Heil, Hough, Ingersoll-Rand, International Harvester, Jahn, Michigan, Union, and White.

Lincoln Appoints Garlinghouse

Garlinghouse Bros., 2415 E. Washington Blvd., Los Angeles 21, Calif., has been appointed distributor for Lincoln Engineering Co., St. Louis, Mo. Garlinghouse will handle Lincoln's complete line of industrial lubricating equipment in the Los Angeles district.

W. Va. Dealer for Yale & Towne

Baker Equipment Engineering Co., 404 Morris St., Charleston, W. Va., has been appointed distributor in the Charleston area for The Yale & Towne Mfg. Co., Philadelphia, Pa., manufacturer of materials-handling machinery.

(Concluded on next page)

Distributor Doings

(Continued from preceding page)

Baker Equipment operates from offices in Charleston, Huntington, Bluefield, and Clarksburg.

Tractor Sales Appoints Moore

The Tractor Sales Corp., 1409 Santa Fe Ave., Los Angeles, Calif., has appointed Donald Moore as National Sales Representative for Everett trenchers, and McGee scrapers and angle dozers. Before his present appointment, Mr. Moore was Assistant Sales Manager of The Skyline Corp., Wichita, Kans.

Distributors' Dirge

It still looks wintry enough in the east, but down in Los Angeles something stirred. Was it the song of a bird? No, it was Frank McBath of Columbia Equipment Co., Portland, Oreg., and Al Garlinghouse, of Garlinghouse Bros., Los Angeles, breaking into verse. They send us, for their fellow dealers, the following modern version of a well known poem:

BAREFOOT BOY

Blessings on thee, little man,
Barefoot boy, with cheeks of tan,
Trudging down the dusty lane
With no thought of future pain;
You're our one and only bet
To absorb the national debt.

Little man with cares so few,
We've got lots of faith in you;
Guard each merry whistled tune;
You are apt to need it soon.
Have your playtime while you can,
You soon may be a barefoot man.

Equipment Dealers—this is your department, so send your news—all about your new plants, new lines handled by your company, new staff appointments, and other news of your company.

An I-H engine rated at 125 hp at 1,600 rpm now powers the Model 42 Roadmixer.

Travel Mixing Plant Has Increased Power

The power source for the Model 42 Roadmixer, traveling mixing plant made by Wood Mfg. Co., P. O. Box 620, North Hollywood, Calif., has been increased from 100 hp at 1,800 rpm to 125 hp at 1,600 rpm. According to the company, the additional torque power of the International-Harvester UD18A engine produces approximately one-third more power.

The Model 42 Roadmixer is self-powered and self-propelled, with a mixing capacity up to 200 tons per hour. The other two traveling mixing plants built by Wood are the Model 54, tractor-drawn and powered, with capacity up to 350 tons per hour; and the Model 36, self-powered and self-propelled, with capacity up to 150 tons per hour. All three units are used for asphaltic and soil-cement surfacing or resurfacing, and base-course stabilization.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 337.

A High-Tensile Rod For Cast-Iron Welds

An electrode for cast-iron welding has been announced by Eutectic Welding Alloys Corp., 172nd St. and Northern Blvd., Flushing, N. Y. EutecTrode 26, it is reported, differs from conventional ferrous electrodes in that the carbon content in the deposited metal is evenly distributed. Analysis of the metal deposited will show a uniform amount of carbon similar to a high-tensile high-carbon steel, thereby increasing the tensile strength of the weld, according to the company.

Complete details, technical specifications, and data sheets may be secured from the company. Or use the Request Card at page 16. Circle No. 388.

Oil-Filter Cartridges

New literature describing a complete line of oil-filter replacement cartridges is available from Fram Corp., Providence 16, R. I. The company makes cartridges for both full-flow and part-flow oil filters, to provide the oil filtration required by various automotive engines.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 329.

Use the
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or Printed
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or Described
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Cableways Erected For Australian Dam

A Fixed Head Tower and Two Traveling Tail Towers Support Two 1,640-Foot-Span Cableways at Warragamba Dam

By H. BOWDEN FLETCHER, UTPS
Correspondent, New South Wales, Australia

• WARRAGAMBA Dam in Australia is being constructed by the Metropolitan Water, Sewerage, and Drainage Board to safeguard the water supply of the City of Sydney for the next fifty years. Designed to impound 460,000 million gallons of water, it will provide a supply almost four times the capacity of the existing dams, which when full hold 125,144 million gallons.

The Warragamba River flows through a gorge about 1,000 feet wide and 500 feet deep. The dam itself will be about 400 feet high, 360 feet through at the base, with a crest 1,350 feet long. As there is no spot where a separate spillway can be constructed, provision is made for floodwater to pass directly over the crest of the wall—of which 300 feet will be used for the purpose.

About 750,000 cubic yards of material will have to be excavated for the foundations and 1,750,000 cubic yards of concrete will be required, for which some 2,750,000 tons of aggregate will have to be transported 12½ miles from the Nepean River. For handling this excavation and concrete, a two-cable ropeway has been erected with a capacity of 170 tons per hour, using 550 buckets each with a capacity of 27½ hundredweight.

Cableway Specifications

The cableways had to meet the following specifications as laid down by the MWSB when bids were called: hoisting speed, 300 fpm; lowering speed, 300 fpm; carriage travel speed, 1,200 fpm; and tail-tower traversing speed, 50 fpm. These speeds are based on normal loads of 18 tons, with lower speeds for maximum loads of 22 tons.

The specifications called for a head tower common to both cableways, on the east bank; and two traveling tail towers on the west bank, one for each cableway, on a common radial track. Due to the nature of the west bank, it was not possible for one track to command the upper portion of the dam construction without the use of very high tail towers. It is therefore intended to construct a shorter track higher up; in the later stages of construction, one of the tail towers will be transferred to the higher track and, with lengthened ropes, will handle the small amount of concreting not possible from the lower track.

The design on which the successful bidder, Perry Engineering Co., Mile End, South Australia, based its bid provided for a rigid head tower about 120 feet high with the main-rope anchorages at 112 feet. This tower was to be constructed as a cantilever with the back legs carried down some 40 feet and anchored in rock below the

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Cableways Erected For Australian Dam

(*Continued from preceding page*)

surface. The tail towers were to be about 40 feet high.

The span of the cableways was fixed at 1,640 feet—that is, the horizontal distance between pin connections of the main-cable anchorages. This was also the radius of the curvature of the rear tracks of the tail towers. The loaded sag was based on 6 per cent of the span at center.

The moving load of the cableways was fixed by the fact that 8-cubic-yard buckets were to be used and that the largest-diameter locked-coil rope available was 3 inches in diameter with a breaking strength of about 500 tons. With this breaking strength, the factor of safety over cable tension of 150 tons was 3.3, without taking account of the impact and local bending stresses. In view of the fact that breakages have occurred in other countries where 8-cubic-yard buckets on 3-inch-diameter cableways were used, provision has been made in the Warragamba cableways to incorporate roller bearings throughout so that anchor eyebars can oscillate vertically and horizontally with a minimum of friction. In addition, the Ward-Leonard system of control has been adopted—mainly because it permits easy and fine control, and smooth acceleration, and thus reduces to a minimum the effects of impact on the main cable.

As an additional precaution, the sockets of the main cable were designed to bear against a taper rolled thrust bearing. Also, means were provided for rotating the cable every now and then so that any wear due to carriage wheels would be spread round its full circumference.

Perry Engineering Co. Photo

The head tower on the east bank of Warragamba River is 112 feet high. At its base is the machinery shed housing winches, generators, compressors, etc.

Head Tower

The head tower is of extremely solid steel construction, in pyramid form, with the vertical back legs carried down some 40 feet into rock and terminating in a grillage. The shafts were concreted in only when the steel erection was nearly completed, so as to prevent construction stresses being set up during the erection.

Considering the fact that the tower is 112 feet high and the possible static rope pull is 350 tons, stresses of considerable magnitude had to be dealt with. The section adopted for the four main legs was a 24 x 24-inch box section formed by two fabricated channels facing toe to toe. The channel flanges were made from 8 x 1½-inch flats and the webs of 21 x 1¼-inch plate. Automatic welding machines with submerged arc were adopted, with outstanding success, for forming the channels.

Bracing consists of battened channels spaced at the same depth as the main leg boxes. The top side checks were fabricated from plate as units, bolted to the legs, and connected by stiff diaphragm plates and by box girders in which were welded the housings for roller bearings of the heavy anchor gudgeon forgings. The gudgeons were spaced at 4-foot centers and the main-cable eyebars were connected to them by pins rotating in SKF roller bearings.

The brackets carrying hoist and in-haul sheaves were fitted at the bottom

(*Continued on next page*)

end with roller bearings on stub axles in line with the gudgeons; at the top, they were bolted direct to the gudgeons so that the sheaves are constrained to follow the line of the main cable when the tail towers are traversed. Separate roller bearings carry the over-haul and other sheaves.

Lateral cantilevers at the top of the tower carry the wire ropes from which the multi-core cables are suspended for controlling the motors which traverse the tail towers. Railed stairways give access to the top of the tower, to the driver's cabin, and to the platforms, which are large enough to permit the servicing of carriages.

A 40 x 50-foot machinery house under the base of the tower holds the winches, generator sets, controller cubicles, and air compressors for the brakes and clutches.

Tail Towers

The tail towers are mounted on equalizing bogies so that there is a group of 8 wheels under each leg, running on 4-foot-8½-inch-gage track with 107-pound rails. These bogies carry only vertical reactions. The main lower girders of the tower itself are carried back and down and are fitted with horizontal equalized bogies bearing on the 107-pound single rail bolted to the back of the concrete track foundations. The horizontal bogies are designed to take the whole of the horizontal components of the rope pulls. Concrete ballast blocks, weighing 280 tons for each tower, were placed on the rear section of the tower girders to prevent overturning. These counterweights exceed by 33 per cent the weight required to balance the tower when subjected to the maximum overturning pull imposed by a load of 22½ tons.

The tower traversing mechanism consists of a 75-hp motor with worm gear and spur reductions to a final-drive pinion; the pinion meshes with a steel rack secured to the back of the track foundations. Power supply for these motors is picked up by current collectors from three bare wires running along the back of the tracks.

The main cable is secured to a 10-part take-up tackle. A motor-driven winch is provided for this tackle, so that sag adjustments of the main cable can be speedily effected.

Mechanical Equipment

Each cableway is operated by a two-drum winch driven by a 500/670-hp 420/560-volt dc motor, using the Ward-Leonard system of control.

The hoist drum, which is grooved and winds three layers of rope, is permanently geared to the motor. The drum for traversing the cableway carriages carries a narrow spool on which the endless traversing rope is wrapped. This drum can be clutched to the hoisting drum so that both revolve when traversing the carriage; or it can be declutched and held by a brake when hoisting and lowering operations are required. The air control valves also provide a pneumatic interlock between clutch and brake.

The traversing-drum clutch is of multiple-disk plate type with Ferodo lining, and is set by air cylinders; the thrust is self-contained so that there is no end thrust on the drum-shaft bearings. When hoisting or lowering is being carried out, the traversing drum is held by a band brake which is weight-applied and air-released.

For the winch the braking system comprises, first, a 30-inch dc magnetic service brake on the motor spindle. Speed control, down to very low speeds, is obtained by the Ward-Leonard system, as well as dynamic braking, so that this magnetic braking is normally applied at very low speeds.

Perry Engineering Co. Photo

Here are the two traveling tail towers, 40 feet high, on the west river bank. One will be transferred to a higher track later on to handle the upper concreting.

Its capacity is sufficient, however, to arrest and hold the full load when it is being lowered at maximum speed. A band brake, weight-applied and air-released, is also fitted to the hoisting drum for emergency use.

Each cableway carriage is of two parts: one has 8-track wheels running on the rope and the other has 6-track wheels plus the wheel carrying the fall-rope carrier gear. It is also possible to vary the spacing between the two halves of the carriage so that, when winding from a big depth, the work can be done without danger of the hoist ropes getting twisted.

The hoisting block is fitted with a hook which can be swung out of line by compressed air to permit rapid disengagement and re-engagement with the bridle of the concrete bucket. An air cylinder serves this purpose; it is so arranged that the piston forms a rack engaging with a toothed sector integral with the top of the shank of the hook. Air supply to the actuating

(*Continued on next page*)

Cableways Erected For Australian Dam

(*Continued from preceding page*)

cylinder is provided by a trailing length of hose with a quick-break connector.

Control System

The Ward-Leonard system consists of an ac motor driving a dc generator which is connected electrically to the winch motor, the control being obtained by altering the value of the field in the generator. When low voltage is applied to the generator field, the generator will produce a low voltage which, in turn, is fed into the winch motor so that it will operate at low speed. As the voltage on the field is increased, so the speed of the winch motor increases, and vice versa.

The generator is provided, in addition to the separately excited field, with a series field placed in reverse. In the event that the master controller is thrown hard over and there is a tendency to produce a voltage on the winch motor too rapidly, the action of the series field will keep down the magnetic flux brought about by the separately excited winding until the winch motor has accelerated sufficiently to produce a back electromotive force to stabilize the current flowing. This prevents abrupt and objectionable changes of speed from too-rapid operation of the master controller handle.

The separately excited field on the generator is under the control of a potentiometer whose contractors are controlled by the master controller on the driver's desk. The motor field is connected directly across the exciter, and is continuously energized. The main 610-hp squirrel-cage ac motor operates at 3,300 volts and is controlled by an autotransformer-type starter.

There is special provision against field failure of the winch motor and overspeed.

Bearings

The problem of bearings for the main-cable anchorage was considered so important that the case was submitted to SKF in Sweden. The angle of oscillation of the anchor eyebars, in vertical plane, is less than 10 degrees. Due to the movement of the tail towers, the anchorage has to move through an angle of about 20 degrees in plan. Such small movements brought up the possibility of indentation, but SKF was convinced that the recommendation it submitted would be trouble-free. The main-cable take-up sheaves were fitted with heavy-duty ball bearings, on the recommendation of SKF, to reduce friction and insure lubrication.

Operating Ropes

The main cables of locked-coil con-

(*Concluded on next page*)

struction were made by Latch & Batchelor, while all operating and standing ropes came from Australian Wire Rope Works, Ltd. The hoist rope is of preformed 6/37 construction, 15/16 inch in diameter, and the carriage traversing ropes are of flattened-strand construction, 1⅛ inches in diameter. The main take-up tackle is a 10-part 1½-inch-diameter rope of 6/41 construction, specially laid and preformed.

Maintenance Equipment

Two 200-ton jacks are located in the pits, so that the tail-tower wheels can be removed quickly and easily. A horizontal jack, to relieve the load on the horizontal bogies of the tail towers, is also provided. A steel pole fitted to the head tower makes it possible to remove the wheels by normal hoisting tackle. The machinery-house framing is strong enough to carry crawls so as to permit machinery parts being removed by block and tackle.

Driver's Controls

The control deck of the driver is fitted with a master controller for the main winch; a master controller for remote control of the tail-tower traversing motor; a Westinghouse valve for the traversing-drum clutch and brake control; a Westinghouse valve for the emergency brake; and the necessary gages and instruments, including a comparative-speed indicator.

An indicator in each driver's cabin shows distance traveled and height of hoist block. Limit-switch protection against over-traversing of carriages and over-hoisting of hook is provided. In addition there is a supervisory controller which ensures that hoist limit is not approached at high speed.

Installing Cable

The only erection problem of any importance which faced the contractor was in connection with the main cables, each of which weighs about 18 tons. The cable was supplied on a large reel weighing in itself several tons, while each end connection weighed ¾ ton. Light ropes were run over the gorge, a 1⅜-inch-diameter wire rope was hung over from tower to tower, and the main cable was then pulled across on this, roller hangers being attached at intervals.

Credits

The Metropolitan Water, Sewerage, and Drainage Board carried out excavation, concreting, and laying of the tail-tower tracks. Perry Engineering Co. erected the cableways.

Subcontractor for the whole of the electrical system was Noyes Bros. (Sydney) Ltd., and its subcontract stipulated the use of Mather & Platt motor-generator sets and main-switch motors, and Compton Parkinson (Australia) motors for other purposes.

The whole of the switch gear was made by Security Electric Pty., Ltd., of Sydney, and the installation was designed by A. V. Pickering of Noyes Bros.

The Engineer for Construction on behalf of the MWSB in the early stages of work was W. Hudson, who is now Commissioner for the Snowy River Development. He has been replaced at Warragamba by B. S. Dowling.

Hydraulic-Valve Catalog

A complete catalog on its line of manual valves for pressures from 0 to 6,000 psi is available from Barksdale Valves, 1566 E. Slauson Ave., Los Angeles 11, Calif. The patented Shear-Seal sealing principle employed in these valves is specifically designed to provide a low handle load and tight seal under high fluid pressures. Four-way selector, shut-off, and dual-pressure valves are available for pipe sizes ¼ to 1½ inch.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 365.

Metallizing Handbook

A 250-page metallizing handbook has been put out by Metallizing Engineering Co., 38-14 30th St., Long Island City, N. Y. With its illustrations, diagrams, charts, and text, it provides a comprehensive coverage of the technical as well as practical aspects of the process.

The handbook details the various methods of surface preparation and the application of metallized coatings for machine element work, for corrosion work, and special production jobs. Supplementary information includes the repair of blow-holes in casting, brazing and soldering, glass and ceramics, mass coatings in tumbling barrels, electric circuits, and model work.

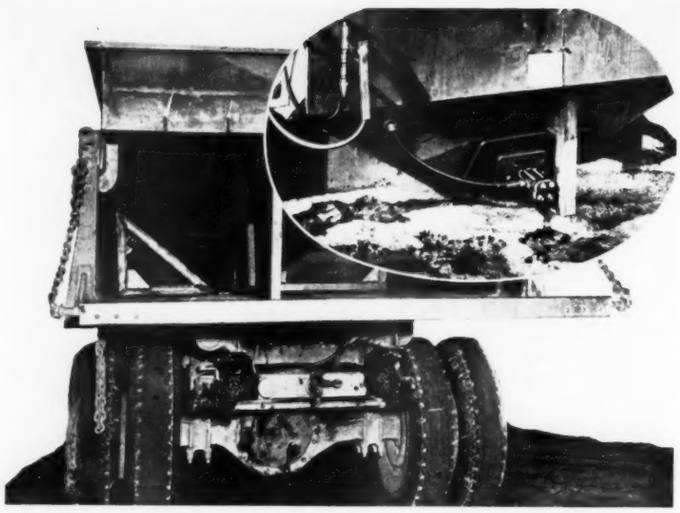
This Metallizing Handbook may be obtained from the company at a cost of $3.00.

Firm Licenses Use Of Water-Repellent

Following a patent granted on the application of silicone masonry water-repellents, the Wurdack Chemical Co., 4977 Fyer Ave., St. Louis 9, Mo., has announced that it will grant licenses to applicators. The product, known as Crystal, is a transparent fluid to line the pores of masonry without sealing or clogging them. After application it is invisible, and the wall continues to breathe, says Wurdack.

Crystal may be sprayed on at any temperature, and will not mar or affect the beauty of the masonry surface, the company says. Other virtues claimed for Crystal are that it protects mortar joints; prevents efflorescence, staining, and spalling; and makes masonry surfaces stain-resistant.

Further information on Crystal water-repellent may be secured from the company, or use the Request Card that is bound in at page 16. Circle No. 350.



Mounted on the tapered side of a hopper-equipped truck, the Cleveland Type F air vibrator keeps ice-removal materials flowing smoothly.

Air Vibrator Helps Sanding Operations

Air vibrators are now being used to speed sanding and de-icing operations on streets and highways, according to Cleveland Vibrator Co., 2850 Clinton Ave., Cleveland, Ohio. The company's Type F vibrator has been installed on the tapered sides of hopper-equipped trucks to keep sand, cinders, or salt moving steadily during spreading operations. It is said to stop troublesome plugging and arching conditions in the hopper. The unit is made in six sizes, for use on containers handling from one to several hundred tons of material. It may also be used in chutes, bins, storage tanks, etc.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 316.

Welding and Cutting Alloys

A 6-page illustrated folder on welding, brazing, and cutting steel with torch and arc has been released by All-State Welding Alloys Co., Inc., 270 Ferris Ave., White Plains, N. Y. It describes techniques of application and the properties of the company's twelve alloys for welding and brazing and one alloy for cutting, particularly developed for use on all types of steel.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 367.

Death of Raymond C. Force

Raymond Charles Force, first President of Caterpillar Tractor Co., Peoria, Ill., and a member of its Board of Directors, died on November 15, 1951, in Oakland, Calif., at the age of 71.

Mr. Force's first association with the crawler-tractor business was in 1919 when he became Vice President and Secretary-Treasurer of the C. L. Best Tractor Co., one of Caterpillar's two predecessor companies. In 1925, when Caterpillar was founded, Mr. Force was named President of the new company and remained in that post until 1930 when he became Chairman of the firm's Executive Committee and a member of the Board. He served in the latter capacity until his death. During his association with the company, he laid the foundations for many of its basic policies.

The Multi-Vise weighs 28 pounds and can be carried from one job to another. An all-steel tool, it is guaranteed unconditionally against breakage.

Multipurpose Vise

A multipurpose vise, unconditionally guaranteed against breakage, is made by American Implement Co., 2523 Taylor St., Omaha, Nebr. The Multi-Vise is all-steel, weighs 28 pounds, and can be easily carried from one job to another. Available in three models, it has a 360-degree vertical swivel, a horizontal swivel, or a double swivel with both horizontal and vertical swivels.

The vise is easily removed from the bench plate and carried to another location. It has removable, replaceable, reversible jaws. Jaw capacity is 6 inches square, 5¾ inches around.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 355.

Expands Western Office

Bucyrus-Erie Co., South Milwaukee, Wis., manufacturer of excavators, drills, and tractor equipment, plans a larger stock of replacement parts and of tractor equipment at its new San Francisco headquarters, 120 Freeway St., South San Francisco, Calif. Modern sales offices and expanded warehouse and yard storage space will enable the company to provide better service facilities for customers.

Excavator Division sales and service personnel includes J. H. Sackett, Western Sales Manager; H. L. Livingston and H. E. Lowe, Sales Representatives; and A. O. Belding, Service Engineer. In the Tractor Equipment Division, H. R. Langford is District Representative; John Plehn, John Carlile, and W. O. Blattner, Sales Representatives; and Ralph Bickers, L. L. Brown, and R. E. Jephson, Service Engineers.

Catalog on Paving Products

An 8-page catalog on Sealtight paving products has been prepared by W. R. Meadows, Inc., Elgin, Ill. The products include asphalt, cork-fill, and fiber expansion joints; dummy joints; concrete-curing compounds; subgrade paper; road-marking paints; premolded tongue-and-groove center strips; and rubber-asphalt joint seal. The catalog describes and gives specifications of each product, plus information on ordering. It also points out that the company's engineering specialists are prepared to help solve special paving or construction problems.

This literature may be obtained from the company. Or use the Request Card at page 16. Circle No. 273.

NHUC Director Urges United Highway Front

If all groups and individuals interested in the continued progress of highway transportation would sink their differences and join in one huge cooperative effort to correct the mounting defects in our highway systems, real achievement could result. This was the theme of an address delivered recently at the National Transportation Meeting of the Society of Automotive Engineers by Arthur C. Butler, Director of the National Highway Users Conference. That the time has now come for such an effort emerged clearly from Mr. Butler's remarks on what he called the "serious bogdown" in the present highway situation. Tracing the causes of the muddle, he cited some hard facts.

Our inadequate highway system is partly the fault of the vast and unforeseen increase in the volume of traffic. "Forty-four million vehicles by 1960" was the estimate of highway experts some 10 years ago. The 1951 record of close on 50,000,000 registered vehicles thus indicates at least one reason for present inadequacies. Because of the steel shortage, overdue highway-improvement projects are being delayed or postponed, and in this connection Mr. Butler stressed that the American defense economy is being jeopardized by a situation which may well deteriorate. An efficient flow of raw materials, parts, components, and finished products to the places where they are needed, when they are needed, will not be possible over congested roads, he said; and the sooner this is realized by those who make the materials allotments, the better.

Added to the structural-steel shortage and the increase in traffic, other contributory causes of our present unhappy situation are as follows, according to Mr. Butler. While the highways are wearing out, too much highway-user revenue is being diverted to a variety of purposes unrelated to roads. Some projects undertaken in the past were unimportant and showed a lack of sound highway planning. Another enemy of highway transportation, said Mr. Butler, is the ton-mile tax, which he called a "definitely backward step in highway legislation". (The theory assumes that, for vehicles of every type and size, tax responsibility should be measured by multiplying the weight of the vehicle by the miles traveled.)

Mr. Butler emphasized that road engineers, highway-user groups, and others, both within and without the highway transportation industry, are acutely aware and are fully agreed that something must be done now. From that agreement must come a cooperative program.

C. G. Thornburgh Dies

Charles G. Thornburgh, a vice president of The Rust Engineering Co., died suddenly from a heart attack on December 5, 1951. Mr. Thornburgh had been associated with The Rust Co. for the past 26 years.

Transport Trailers Expands

Transport Trailers, Inc., Cedar Rapids, Iowa, announces the completion of a large factory expansion program, which has increased production facilities approximately 300 per cent. Many new trailer models are being designed and put into production.

Modular-Design Aids

Modular-design scales to enable rapid and easy modular planning, design, computing, and estimating for brick, structural tile, and concrete blocks of all types and sizes have been developed by Palmer Mfg. Co., 3237 Lee Blvd., Arlington 1, Va. The scales are based upon a 4-inch increment or module and are intended as an aid in applying the principals of modular coordination in the preparation of architects' drawing.

They may be used to meet any application of design or layout work, the company says. By using these grid scales under a tracing paper, the drawings can be made without the use of an architect's or engineer's scale. The dimensions can be established at a glance. These scales are also printed on a tracing paper on which drawings can be made directly. Sheets are available in various scales—⅛, ¼, ¾ and 1½-inch equals 1 foot 0 inches. The Modular Grid-Paper is 32 inches wide and comes in rolls from 5 yards up.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 324.

Data on Hydraulic Loaders

A complete description of Reese hydraulic loaders and other front-end tractor attachments is given in a 4-page bulletin prepared by Reese Engineering Co., 4441 S. Santa Fe Ave., Los Angeles 58, Calif. The loader has a bucket capacity of 1½ cubic yards, or 8,000 pounds. Extra attachments include coal and snow buckets, digging teeth for the buckets, a fork-lift attachment, backfill blade, angle-dozer blade, and ballast box. On-the-job photos show the various attachments in use. Other illustrations point up the design and operational features of the Reese loader.

This literature may be obtained from the company. Or by using the Request Card at page 16. Circle No. 283.

Concrete Apartments Have All the Comforts

In Building to House 320 Apartment Units, Builder Has to Sheet and Shore Foundation Perimeter

• AT a cost of $3,000,000 in invested money, the 901 Corporation has constructed near downtown Denver, Colo., one of the most luxurious apartment houses ever to be built in the mile-high city. N. G. Petry Construction Co. was the general contractor, and Victor N. Jones & Associates handled the architectural and engineering details.

The project will relieve Denver's housing shortage, which is connected with her growing pains. There are 320 studio, 1-bedroom, and 2-bedroom apartments in the big four-wing building, which includes 14 stories and a penthouse. It is built of reinforced concrete, with a brick-veneer exterior, plastered interior, and beautifully landscaped grounds. The building has unusual basement storage space for 202 automobiles. In addition, it has laundry and storage spaces, and a small shopping center.

Started in July, 1950, the building was scheduled for completion late last fall, and at the time the job was visited, applications for apartments were already being handled by Cartwright Realty Co., the managing agent.

Excavation Subbed

Building the basement substructure involved the excavation of about 36,000 cubic yards of sandy material. A subcontract was let to the Denver firm of Horn & Stephenson, which moved in quickly. It was strictly a shovel-truck job, with Horn & Stephenson using a 1½-yard Bay City shovel and a fleet of 5-yard dump trucks. The material was sold to many people in the vicinity who wanted it for fills and other such purposes.

Excavation brought into the picture one of the worst job problems: the protection of adjacent property during the dirt-removal phase. The property line of Sherman Plaza Apartment runs very close to a large brick private residence and a brick private school. It was necessary to go 20 feet below the school foundation, within a distance of 10 to 12 feet, and the situation called for extreme care.

A solid row of 3-inch fir sheathing was driven down several feet below the bottom of the new apartment foundation. A small air compressor and a pneumatic sheeting driver were used to get the timbers down. The top of this heavy timber wall was then braced and tied with cable, and was carefully observed while the balance of foundation excavation was removed. That part of the work was completed without a mishap. The sheeting for the most part remained in place after the backfill was finally put in. It was completed, of course, above the danger point just as soon as the concrete footings were finished.

A Big Concrete Job

Measured by any building standards, the Sherman Plaza Apartment is a big concrete job. It is a modified beam-and-girder design, with the middle, end, and elevator walls serving as bearing walls. The building also rests on some spread footings.

Everything from the second through the twelfth floor is uniform so it was possible to re-use the concrete forms over and over. Forms consisted of plywood facing 5/8 inch thick nailed to 2 x

(Continued on next page)

C. & E. M. Photo

The Sherman Plaza apartment house going up. The huge concrete building, designed to relieve the housing shortage in Denver, Colo., contains 320 apartments.

Concrete Apartments Have All the Comforts

(Continued from preceding page)

4 studs. The panels were made up at the site, after DeWalt power-saw equipment in a carpenter shed there cut the plywood and studs to proper dimension. The panels as a rule were placed vertically and joined by Superior clamps and ties. Superior snap ties were also used to hold the wall forms from spreading.

Vertical columns were formed with wood and held by steel clamps. The various floor pours were also made on plywood panels, which were supported from below by 4 x 4 wooden shores and wedges. One particularly heavy concrete beam, 29 feet long x 5 feet wide x 4 feet thick, had to be supported on heavy timber bents and literally poured in the air. It carries the entire front wall section. Another odd piece of formwork was the entrance canopy, which is cantilevered off two heavy steel supports.

C. & E. M. Photo

General Superintendent C. E. Walter, of N. G. Petry Construction Co., checks over the plans of the Sherman Plaza project. He had several trouble spots to contend with during construction.

The concrete was a regulation 6-sack mix, with 1½-inch-maximum aggregate and enough sand to make the mix workable. Concrete, Inc., a Denver commercial concrete supplier, furnished the mixed material in a fleet of Ransome truck mixers. They delivered to a surge hopper at the foot of a high 182-foot Archer tubular tower, and the concrete was then hoisted by a 105-hp O.K. 3-drum hoist to the level at which the concrete was being placed.

The tubular tower had a built-in stiffleg crane for hoisting miscellaneous building materials to the working areas. Unlike many another such setup, this crane base was distributed to four bearing points. It was safe and fast. The one hoisting operator inside the small shack nearby controlled the derrick, and also hoisted the buckets of concrete up to the pouring level.

There were eight Jackson hand buggies to carry the concrete away from the tower platform. A standard Viber electric vibrator consolidated the material, and helped distribute it around the heavy reinforcing steel in the walls.

The work moved ahead at the rate of about two floors per month. Characterized by good organization and a minimum of red tape, it appeared to be a simple, routine operation. And yet in a day's work there were many and constant problems.

For example, plans called for two huge 18-ton Kewanee boilers for the heating system. When the basement part of the building was finished up to the point where the boilers should have been delivered, there was a delay. The boilers couldn't be delivered on time. The concrete crew didn't stop. It went ahead, leaving out some of the curtain walls between the boiler room and the edge of the building. When the boilers finally arrived, a large rented crane lowered them to cribbing at the outside edge of the building. Heavy steel pipe rollers were laid to carry the boilers over the floor to the point where they were to be set up. Chain hoists were then rigged, and the boilers were slowly but surely edged around to their final position on their steel leg supports. The missing curtain walls could then be formed and poured.

Simultaneously with the concrete work, a great many of the specialty items needed in any building were in progress: plumbing, heating, electrical

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work. Later on, the brick veneer and plastering got under way. Several specialty subcontractors had these jobs. T. E. Grosvenor had the brick contract and M. A. Mackay the plaster. Denver Plumbing & Heating Co. did both the plumbing and heating, and the John Kelly Co. had the electrical work.

Field operations for the contractor were under the general supervision of N. R. Petry. C. E. Walter was the General Superintendent, and he was assisted by Maynard Tescher.

Denverites are showing unusual interest in the new building, because it is the last word in comfort. Beautifully appointed, with first-class fixtures throughout, the Sherman Plaza should be a sound investment for the future.

To Toll-Road Users—Beware the Watchdog

It's not a flesh-and-blood dog and it won't bite, but it would be hard to get by on the New Jersey Turnpike—that is, of course, only if users had any idea of evading payment of the correct toll. Since the opening of the Turnpike in November, 1951, the combined punch-card accounting machines and axle-counting system developed by Remington Rand, Inc., New York, N. Y., have proved a stringent and faithful guardian against would-be toll dodgers. This is the way it works.

The driver picks up his pay-as-you-leave ticket as he enters the Turnpike. It is prepunched to indicate the point of entry and the type of vehicle, and preprinted with correct tolls for every point of exit. He then continues, without slowing down for tolls, until ready to leave the highway. Making a right turn—there are no left turns—he drives through a toll lane at the exit interchange and there turns in his ticket to the toll collector, who takes the fare printed on the card for this particular interchange.

As the vehicle approaches the toll gate, a "pedestrian-proof" treadle registers the number of vehicles and axles. This obviates any mistake on the part of the collector and serves as a check against the type of vehicle registered on the ticket at the point of entry. The design of the treadle permits it to indicate the number of axles rolling over it, while at the same time differentiating between a forward or reverse direction. This information is recorded in remote electrical recorders, one for each toll lane, housed in the register room of the interchange utility building—a room accessible only to Central Office tellers and maintenance men. Finally, a validating machine stamps on each ticket the exit-interchange number, the time and date of collection, and the number of the collector.

Members of the N. J. Turnpike Authority staff and toll collectors were trained in the use of business machines by Ruth C. Ruemmler, of Remington Rand, Inc. Here A. C. Haldeman, also of Remington, hands her some cards to be punched with exit-interchange numbers, toll-collector numbers, and time and date of collection.

As the collector goes off duty, he puts his fares in a moneybag together with a deposit slip, and the corresponding tickets with a duplicate deposit slip in another bag, and places both bags in a vault in the utility building. Every morning a Central Office teller picks up the money, the tickets, and the remote-electrical-recorder tapes, and takes them to the Central Office where all three are mechanically audited for any possible variance.

Remington Rand points out that this system of double checking also provides a complete cross-file for accounting control and statistical information. RR Tabulators automatically punch onto summary cards the daily audits of all information on the tickets. These summary cards are used to tabulate data on mileage for each type of vehicle, average revenue for each type, most-used and least-used interchanges, and traffic volume between interchanges.

The New Jersey Turnpike Authority expects its peak-load problem to be greater than that of similar authorities, as the Turnpike carries both passenger and commercial traffic. Remington Rand's punched-card system is playing its part in enabling the highway to carry a smooth flow of traffic with all data recorded and checked.

Portable Material Elevator

An 8-page catalog describes and illustrates new features of the portable material elevator redesigned by American Hoist & Derrick Co., 63 S. Robert St., St. Paul 1, Minn. The elevator has a larger, stronger platform; a new method of hooking the platform or concrete bucket to the traveling carriage; a stronger traveling carriage with less dead weight; an improved roller-guide arrangement to eliminate side sway; speedier assembly due to the use of pins wherever practical; new tower-section splices; and a new single-unit tower head. The concrete-bucket tripping device is attached to the tower and can be set for any desired dumping height in a matter of minutes.

The catalog also describes a new tower-erection device which simplifies adding extra tower sections.

This literature may be obtained from the company by requesting Catalog No. 250-E-1, or by using the Request Card at page 16. Circle No. 344.

The Paraline—T-square, straightedge, triangle, protractor, 32nds-inch scale, and parallel rules, all in one.

Device for Drafting

A new drafting device introduced by Loomis Industries, Box 442, Berkeley 1, Calif., provides a T-square, straightedge, triangle, protractor, 32nds-inch scale, and parallel rules. It is completely self-contained and requires no attachments or board clamps. The pocket-size Paraline measures 10¼ x 3³⁄₁₆ inches. Its metal parts are incorporated in one section to eliminate slippage.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 272.

Fittings and Joints, Corrosion-Resistant

Welding fittings and joints for pipe with a corrosion-resistant coat are announced by Welstrom, 5th St. and N. Ford Blvd., Hamilton, Ohio. They are available in sizes from ½ to 30 inches in diameter. Standard fittings include concentric and eccentric reducers, 90-degree reducing elbows, lap-joint stub ends, 45-degree elbows, straight tees, reducing outlet tees, and 180-degree return bends and crosses.

The fittings have the same internal diameter as the pipe, to eliminate turbulence. They are designed to prevent failures at joints due to vibration, expansion, and contraction. The fittings and piping systems are coated or lined with corrosion-resistant coatings at the manufacturer's plant. Any alterations which are necessary for field assembly can readily be made in the field, the company says.

A typical fitting has three parts: an internal sleeve and two external fittings. The joint fittings are welded to the pipe ends and both are then coated with a corrosion-resistant coating. The sleeve is then inserted into the fittings, which are butted together and field-welded. This welding destroys the coating on the inside and outside of the fitting for ½ inch on each side of the weld. A cold-setting coating is applied on the outside, and is introduced into the interior of the fitting through a threaded opening; then the opening is sealed with a pipe plug. This treatment is said to leave the interior of the pipe and fitting perfectly flush and fully coated with corrosion-resistant material.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 391.

For Heavy-Duty Hauling

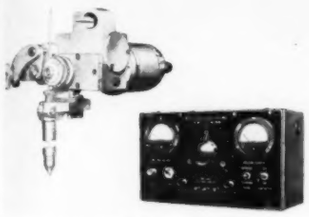
A catalog illustrating a complete line of materials-hauling equipment has been prepared by Easton Car & Construction Co., Easton, Pa. It covers off-the-highway trailers and truck bodies, mine and quarry cars, rocker dump cars and trailers, industrial trucks, and heavy-duty industrial cars. The literature provides illustrations and brief data on the capacity of each unit.

This literature may be obtained by requesting Catalog No. 2, or by using the Request Card at page 16. Circle No. 292.

Small-Parts Plant for Fuller

A new manufacturing plant is the third facility erected within a year by Fuller Mfg. Co., Kalamazoo, Mich. It is devoted exclusively to small, miscellaneous transmission parts, and production lines first went into operation on September 1, 1951, turning out bearing covers, shift yokes, gearshift and hand-brake levers, clutch throw-out yokes, bearing carriers, and shift-bar housings for Fuller heavy-duty transmissions, including the 10-speed one-shift-lever Road Ranger transmissions.

The other two buildings Fuller erected on the same 25-acre site, about ½ mile north of the main plant, are an engineering research building and a service parts building. With these additions, Fuller is able to devote the main plant entirely to the production of gears, shafts, cases, and clutch housings, and to final assembly. The company also plans further expansion in the near future.



Head and positioner control is automatic in the Model 944 welding head—Mir-O-Col Alloy Co., makes it.

A New Welding Head

An automatic welding head which incorporates new design and performance features is produced by Mir-O-Col Alloy Co., Inc., 312 N. Avenue 21, Los Angeles 31, Calif.

Control of both welding head and positioner operation is automatic in the Model 944, as well as of the high-frequency pilot circuit if one is used. The electro-mechanical control circuit is designed to stop both head and positioner drives automatically if the arc is broken or the electrode sticks to the work piece. It automatically cuts off the high frequency the moment the arc is established. Insulation suitable for use with high frequency is provided.

The driving motor operates on either the welding voltage or a separate 110-volt source, or both. Because it is electrically independent of the positioner and welding transformer power supply, phasing problems are eliminated, the company says.

The control unit provides a manual "inching" control; welding voltage control which regulates deposit rate; both manual and automatic control of positioner, welding transformer, and high-frequency unit; and welding current control if the transformer is equipped for remote control. Welding voltage and current meters are provided. All connections are made through simple multiple-conductor connectors. The unit is designed to operate with any positioner or transformer; maximum current capacity is 2,000 amps.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 375.

Lathe-Attachment Catalog

A 35-page catalog on a complete line of attachments and accessories for lathes, drill presses, and shapers has been issued by South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind. It contains a photo, description, and specifications for each attachment. It also lists manuals and wall charts, and motion-picture films on lathe operations that are available in English, Spanish, and French.

This literature may be obtained from the company by requesting Catalog No. 5102, or by using the Request Card at page 16. Circle No. 265.

New-Model Preheater For 14½-Inch Manhole

A Hot-Spot preheater for 14½-inch manholes of bulk storage tanks has been added to the line of Rempe Co., 340 N. Sacramento Blvd., Chicago 12, Ill. It is an all-steel shell-and-coil assembly that is inserted into a bulk storage tank to preheat oil and other liquids before they enter the suction line.

The Hot-Spot rests on the bottom of the tank. Suction pipe and inlet and outlet pipes for heat—either steam or hot water—go through the manhole cover. A special flow accumulator causes the heavy oils or other liquids to flow over heated pipes before entering the suction line. In this way liquids are said to be heated to proper flow temperatures and load is taken off the suction pump.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 275.

Manual on Cutting Fluid

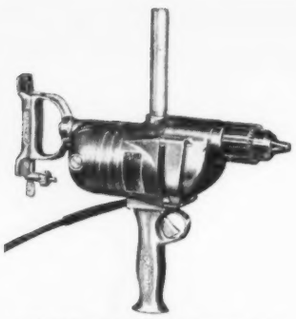
An illustrated 32-page manual entitled "Getting Down to Cases on Metal Cutting" is offered by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa. It contains case histories with facts and figures on Antisep All-purpose cutting fluid. It points out that Antisep acts as a coolant, lubricant, and antiwelding agent, and may be used on approximately 90 per cent of all machining operations. It cites the jobs it has been used on, types of machines, actual machine feeds and speeds, grades of steel, and dilutions of the fluid.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 270.

Personnel, Seiberling Rubber

There have been several staff changes at Seiberling Rubber Co., Akron, Ohio. E. F. Gates, formerly Assistant to O.K. Feikert in the Accessories and Repair Materials Sales Department, is now Manager of the Department; Mr. Feikert will continue as Manager of the Service Department. Carl Figenscher, formerly in the Manufacturers and Government Sales Department, has been promoted to Sales Representative of the Special Products Department, where he will assist in the development of new special products.

Mr. Gates joined the company in 1945 as a ThermoWeld engineer. Mr. Figenscher came to the firm as a time-study engineer and later acted as its Washington representative.



Milwaukee Super Hole-Shooter portable electric drills feature cool running and high load speeds.

Heavy-Duty Drills

New portable electric heavy-duty drills, the Super Hole Shooters, are announced by Milwaukee Electric Tool Corp., 5316 W. State St., Milwaukee 8, Wis. They are offered in 4 sizes: ½, ⅝, ¾, and ⅞-inch capacities.

Helical-cut steel gears are used with double-reduction gear-train drive in the ½ and ⅝-inch sizes, and triple-reduction gearing in the ¾ and ⅞-inch models to meet higher torque requirements of heavy-duty service. Self lubricating ball and roller bearings are used throughout. The drills are available with either a regular heavy-duty 3-jaw geared type of key chuck or Morse taper sockets to accommodate taper shank bits. They are powered by heavy-duty universal motors, and all models operate on 25 to 60-cycle 115-volt current as standard; they are also furnished for operation on voltages of 32, 150, 230, and 250 at slight extra cost.

Further information may be secured from the company by requesting Bulletin D1. Or use the Request Card at page 16. Circle No. 260.

Engineer Shortage Is Costly

The Virginia State Highway Department is so short of engineering personnel that in the last two years it has had to call on more than a dozen private firms for consultant work on surveys and designs. Bridge and highway construction to the value of $40,000,000, exclusive of preliminary surveys, was "farmed out" in this way. According to the Department, outside consultants' fees are double the cost of work done by its own engineers.

The Department is unable to keep up the numbers of its personnel because of the scale of pay offered by the State in comparison not only with private industry, but also with the Federal government. The latter's salaries are at least 15 per cent higher than those the State can give, while a young graduate engineer's starting pay in private industry would be about 10 per cent higher than in the State Highway Department.

Penn Has Fewest Accidents

First place in freedom from accidents in the entire construction industry of the United States goes to District 9 of the Pennsylvania Department of Highways, with headquarters at Hollidaysburg. The rating, made recently by the National Safety Council, shows that not only is this the second consecutive year that District 9 has been low in the nation in accident frequency, but the Pennsylvania Department of Highways as a whole ranks first by a wide margin among all groups of 500 employees or more.

Further details of Pennsylvania's good safety record show that this state's Districts 9, 10, 1, and 12 rank first, second, third, and fourth on a nation-wide basis among all construction groups with 500 or more employees. Averages recorded are: frequency rate—all state highway departments, 14; Pennsylvania, 7.5; severity rate—all state highway departments, 2.08. Pennsylvania had 8 districts showing less than the average.

Give Generously to the Red Cross

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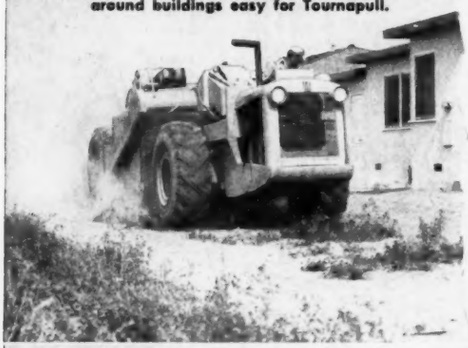
A real money-maker for S. R. MACBETH

Owner has added high side boards to increase pay yard capacity and also to haul big loads over city streets without spill.

Positive power steer, plus big 4-wheel air brakes (2822 sq. in.), make maneuvering around buildings easy for Tournapull.



Rubber-tired, 28 m.p.h. "D" drives over pavement and curbing, fully loaded, without damaging newly-set concrete or tires.

Tournapull—Trademark Reg. U. S. Pat. Off. 8232 a

"D Tournapull's

ability to work in confined places and to carry loads over concrete curbing without damage" are two major reasons why Sterling R. Macbeth, president of Macbeth & Company, Inc., Montebello, California, is so enthusiastic about his new LeTourneau 7-yard Roadster.

"The Roadster's fast, one-man, self-loading operation adds to our profits, too," says Macbeth. "We can drive this machine anywhere. Moving costs are no longer a worry or an expense."

Photos show his mobile, high-speed "D" grading for two new housing projects at Paramount, California . . . leveling building sites, streets and sidewalks in one subdivision . . . using the excess dirt to fill around completed dwellings ½-mile away at the other subdivision.

Places 10 to 11 loads an hour

The 122 h.p. Roadster holds to grade as it self-loads hard, dry, silty loam in an average of 73 seconds . . . completes a typical 4400′ cycle over both paved and unpaved surfaces every 5 minutes and 35 seconds. This includes spreading to grade which takes around 15 seconds, and haul from cut to fill which takes about 145 seconds. In one hour, the "D" delivers 10 to 11 loads of the sun-baked material.

What operator says:

Next to performance records, perhaps one of the best ways to judge a piece of equipment is to listen to what its operator has to say about it. Pete Inman, Macbeth's veteran operator, reports, "This D Roadster is much easier to run than any other scraper I've ever operated. It's excellent on street work and in tight spots because it can be turned around so easily. I never have to lose time backing up."

Check into the profit-producing "D" for yourself . . . it's a money-maker wherever it goes. Works as a self-loading utility tool or in pusher-loaded fleets. Call us, or write today for the complete story.

LETOURNEAU LET EQUIPMENT

R. G. LeTOURNEAU, INC., Peoria, Illinois

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